SERVICE & OPERATING MANUAL

SANDPIPER®
A WARREN RUPP, INC. BRAND

Model S07
Non-Metallic Design Level 1

U.S. Patent #
400,210
5,996,627;
6,241,487

CE

Table of Contents

Engineering Data and Temperature Limitations 1
Explanation of Pump Nomenclature 2
Performance Curve 3
Performance Curve, Trihedral Model 4
Dimensions: S07 Non-Metallic 5
Metric Dimensions: S07 Non-Metallic 6
Principle of Pump Operation 7
Installation and Start-up 7
Air Supply 7
Air Valve Lubrication 7
Air Line Moisture 7
Air Inlet and Priming 7
Between Uses 7
Installation Guide 8
Troubleshooting 9
Warranty 9
Important Safety Information 10
Material Codes 11
Composite Repair Parts Drawing 12
Overlay Option Drawing 12
Available Service and Conversion Kits 12
Composite Repair Parts List 13
Air Valve Assembly Drawing and Parts List 14
Air Valve Assembly Servicing 15
Air Valve with Stroke Indicator Drawing and Parts List 16
Air Valve with Stroke Indicator Servicing 17
Pilot Valve Servicing, Assembly Drawing and Parts List 18
Solenoid Shifted Valve Drawing and Parts List 19
Solenoid Shifted Air Distribution Valve Option 20
Intermediate Assembly Drawing 21
Intermediate Assembly Servicing 21
Modular Check Ball Valve Drawing 22
Modular Check Ball Valve Servicing 22
Modular Trihedral Check Valve Option Drawing and Parts List 23
Modular Trihedral Check Valve Servicing 24
Diaphragm Service Drawing, Non-Overlay 25
Diaphragm Service Drawing with Overlay 25
Diaphragm Servicing, Overlay Diaphragm Servicing 26
Dual Port Option Drawing 27
Dual Porting Options 28
Dual Porting of both suction and discharge ends of the pump 28
Single Porting of the suction and dual porting of the pump discharge 28
Dual Porting of the suction and single porting of the pump discharge 28
Single Port Suction Repair Parts List 29
Single Port Discharge Repair Parts List 29
Dual Port Suction and Discharge Repair Parts List 29
Pumping Hazardous Liquids 30
Converting the Pump for Piping the Exhaust Air 30
Exhaust Conversion Drawing 30
Converted Exhaust Illustration 30
Pulse Output Kit Drawing, Option 31
Optional Muffler Configurations Drawing 32
CE Declaration of Conformity 33

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Environmental Management System ISO 14001 Certified

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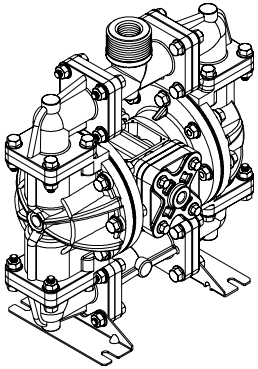

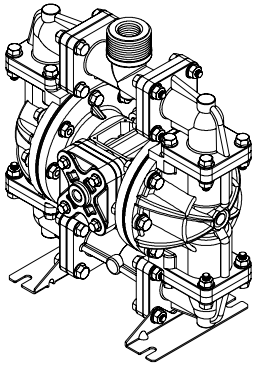

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U.S. Patent # 5,851,109; 5,996,627; 400,210; 6,241,487 Other U.S. Patents Applied for

SANDPIPER®
A WARREN RUPP, INC. BRAND

S07 Non-Metallic Ball Valve

Design Level 1

Air Operated Double Diaphragm Pump

ENGINEERING, PERFORMANCE & CONSTRUCTION DATA

INTAKE/DISCHARGE PIPE SIZE	CAPACITY	AIR VALVE	SOLIDS-HANDLING	HEADS UP TO	DISPLACEMENT/STROKE
Internal Threads ¾" NPT or ¾" BSP Tapered External Threads 1½" NPT or1½" BSP Tapered	0 to 23 US gallons per minute (0 to 87 liters per minute)	No-lube, no-stall design	Ball Valve S07B Models - Up to .15 in.(4mm) Trihedral Valve S07T Models - Up tp .36in (9.1mm) Diameter or .16in^2 area (10.3cm^2)	100 psi or 231 ft. of water (7 bar or 70 meters)	.026 US gallon / .098 liter

CAUTION! ***Operating temperature limitations are as follows:***

Materials	*Operating Temperatures* *Maximum*	*Minimum*
Santoprene®: Injection molded thermoplastic elastomer with no fabric layer. Long mechanical flex life. Excellent abrasion resistance.	275°F 135°C	-40°F -40°C
Virgin PTFE: Chemically inert, virtually impervious. Very few chemicals are known to react chemically with PTFE: molten alkali metals, turbulent liquid or gaseous fluorine and a few fluoro-chemicals such as chlorine trifluoride or oxygen difluoride which readily liberate free fluorine at elevated temperatures.	220°F 104°C	-35°F -37°C
PVDF:	250°F 121°C	0°F -18°C
Polypropylene:	180°F 82°C	32°F 0°C
Nitrile: General purpose, oil-resistant. Shows good solvent, oil, water and hydraulic fluid resistance. Should not be used with highly polar solvents like acetone and MEK, ozone, chlorinated hydrocarbons and nitro hydrocarbons.	190°F 88°C	-10°F -23°C
FKM (Fluorocarbon): Shows good resistance to a wide range of oils and solvents; especially all aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils. Hot water or hot aqueous solutions (over 70°F) will attack FKM.	350°F 177°C	-40°F -40°C
Nylon:	180°F 82°C	32°F 0°C

For specific applications, always consult the Warren Rupp "Chemical Resistance Chart"

CAUTION: Nonmetallic pumps and plastic components are not UV stabilized. Ultraviolet radiation can damage these parts and negatively affect material properties. Do not expose to UV light for extended periods of time.

SANDPIPER® pumps are designed to be powered only by compressed air.

S07 Non-Metallic · Design Level 1· Ball Valve

Type	Pump Brand	Pump Size	Check Valve Type	Design Level	Wetted Material	Diaphragm/ Check Valve Options	Check Valve Seat	Non-Wetted Material Options	Porting Options	Pump Style	Pump Options	Kit Options	Shipping Weight lbs (kg)
S07B1P1PPNS000.	S	07	B	1	P	1	**P**	P	N	S	0	00.	17 (8)
S07B1P2PPNS000.	S	07	B	1	P	2	P	P	N	S	0	00.	17 (8)
S07B1K1KPNS000.	S	07	B	1	K	1	K	P	N	S	0	00.	21 (9.5)
S07B1K2KPNS000.	S	07	B	1	K	2	K	P	N	S	0	00.	21 (9.5)
S07B1N1NPNS000.	S	07	B	1	N	1	N	P	N	S	0	00.	18 (9)
S07B1N2NPNS000.	S	07	B	1	N	2	N	P	N	S	0	00.	18 (9)
S07T1P7PPNS000.	S	07	T	1	P	7	P	P	N	S	0	00.	17 (8)
S07T1P8PPNS000.	S	07	T	1	P	8	P	P	N	S	0	00.	17 (8)
S07T1PBPPNS000.	S	07	T	1	P	B	P	P	N	S	0	00.	17 (8)
S07B1P1PPBS000.	S	07	B	1	P	1	P	P	B	S	0	00.	17 (8)
S07B1P2PPBS000.	S	07	B	1	P	2	P	P	B	S	0	00.	17 (8)
S07B1K1KPBS000.	S	07	B	1	K	1	K	P	B	S	0	00.	21 (9.5)
S07B1K2KPNS000.	S	07	B	1	K	2	K	P	B	S	0	00.	21 (9.5)
S07B1N1NPBS000.	S	07	B	1	N		N	P	B	S	0	00.	18 (9)
S07B1N2NPBS000.	S	07	B	1	N	2	N	P	B	S	0	00.	18 (9)
S07T1P7PPBS000.	S	07	T	1	P	7	P	P	B	S	0	00.	21 (9.5)
S07T1P8PPBS000.	S	07	T	1	P	8	P	P	B	S	0	00.	21 (9.5)
S07T1PBPPBS000.	S	07	T	1	P	B	P	P	B	S	0	00.	21 (9.5)

Pump Brand
S= SANDPIPER®

Pump Size
07= 3/4"

Check Valve Type
B= Ball
T= Tihedral

Design Level
1= Design Level 1

Wetted Material
K= PVDF
N= Nylon
P= Polypropylene

Diaphragm/Check Valve Materials
1= Santoprene/Santoprene
2= Virgin PTFE-Santoprene Backup/Virgin PTFE
7= Santoprene/Nitrile
8= Virgin PTFE-Santoprene Backup/FKM
B= Nitrile/Nitrile
U= Polyurethane/Polyurethane
Z= One-Piece Bonded/PTFE

Check Valve Seat
K= PVDF
N= Nylon
P= Polypropylene

Non-Wetted Material Options
P= Polypropylene
I= Polypropylene with PTFE Hardware

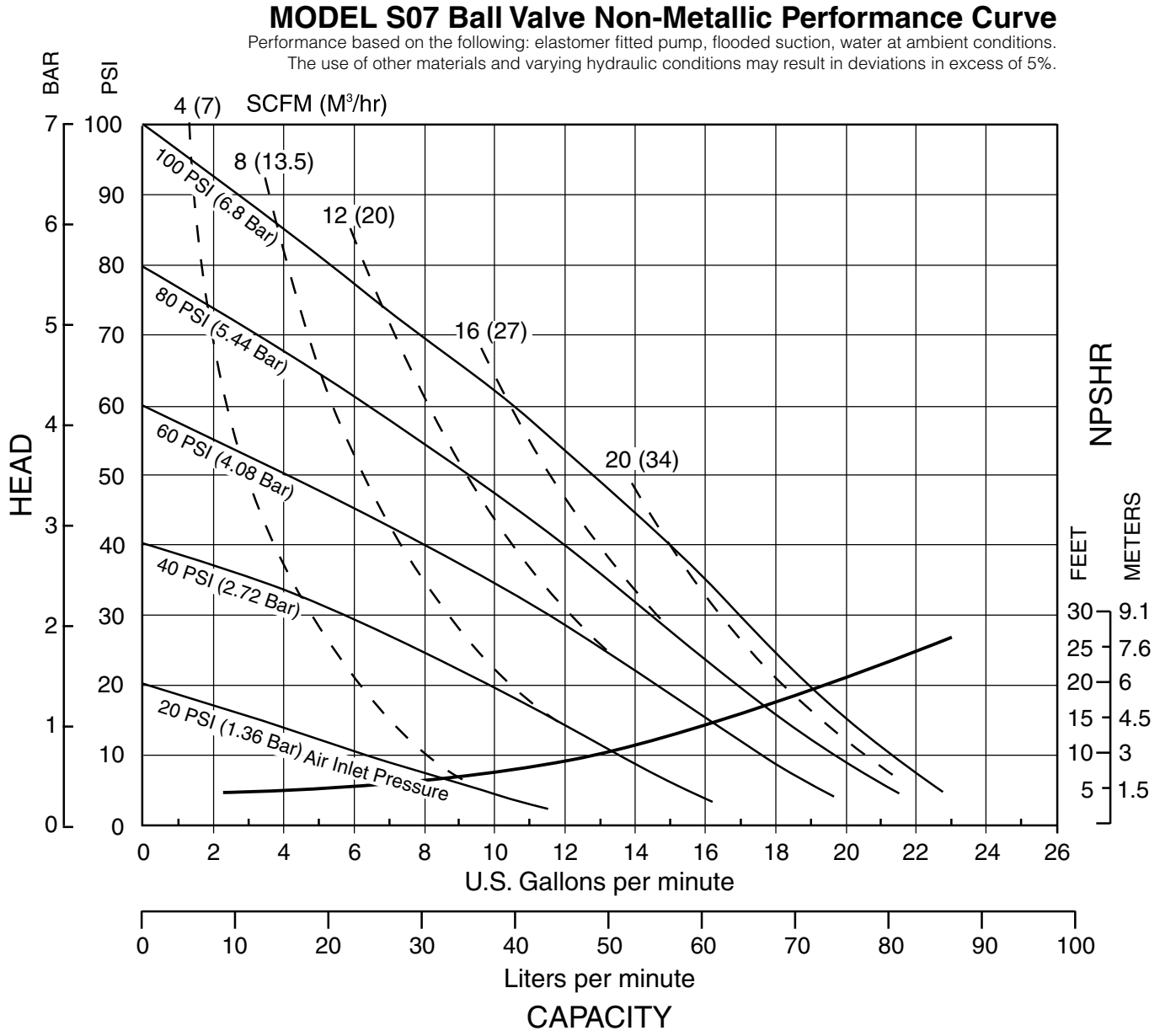
Porting Options
N= NPT Threads
1= Dual Porting (NPT)
2= Top Dual Porting (NPT)
3= Bottom Dual Porting (NPT)
B= BSP Threads (tapered)
4= Dual Porting (BSP) (tapered)
5= Top Dual Porting (BSP) (tapered)
6= Bottom Dual Porting (BSP) (tapered)

Pump Style
S= Standard

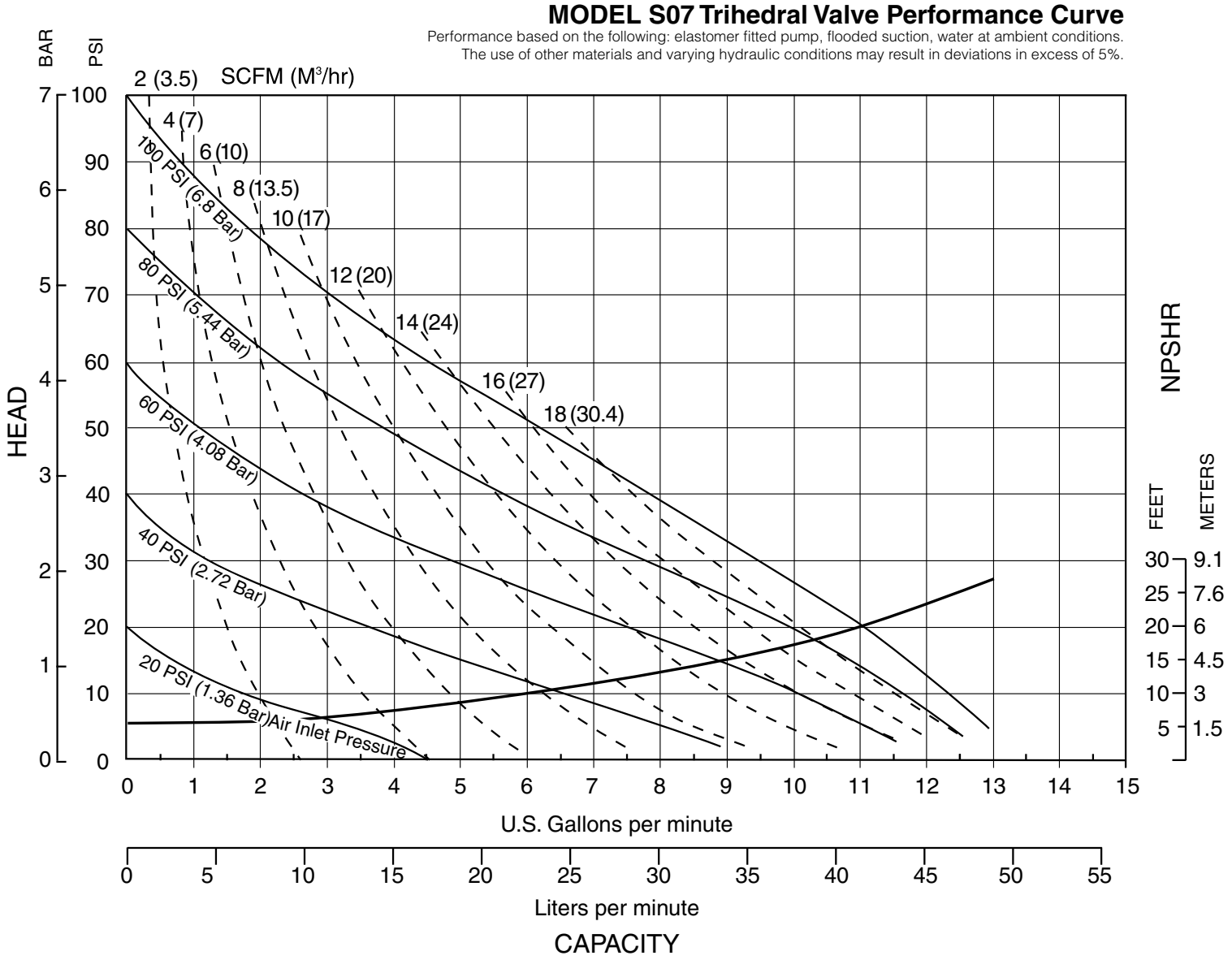
Pump Options
0= None
1= Sound Dampening
2= Mesh Muffler
6= Metal Muffler

Kit Options
00.= None
P0.= 10-30VDC Pulse Output Kit
P1.= Intrinsically-Safe 5-30VDC,110/120VAC, 220/240VAC Pulse Output Kit
P2.= 110/120 or 220/240VAC Pulse Output Kit
E0.= Solenoid Kit w/24VDC Coil
E1.= Solenoid Kit 24VDC Explosion-Proof Coil
E2.= Solenoid Kit w/24VAC/12VDC Coil
E3.= Solenoid Kit w/12VDC Explosion-Proof Coil
E4.= Solenoid Kit w/110VAC Coil
E5.= Solenoid Kit w/110VAC 60 Hz Explosion-Proof Coil
E6.= Solenoid Kit w/220VAC Coil
E7.= Solenoid Kit w/220VAC 60 Hz Explosion-Proof Coil
E8.= Solenoid Kit w/110VAC 50 Hz Explosion-Proof Coil
E9.= Solenoid Kit w/230VAC 50 Hz Explosion-Proof Coil
SP= Stroke Indicator Pins

S07 Non-Metallic Performance Curve Curve

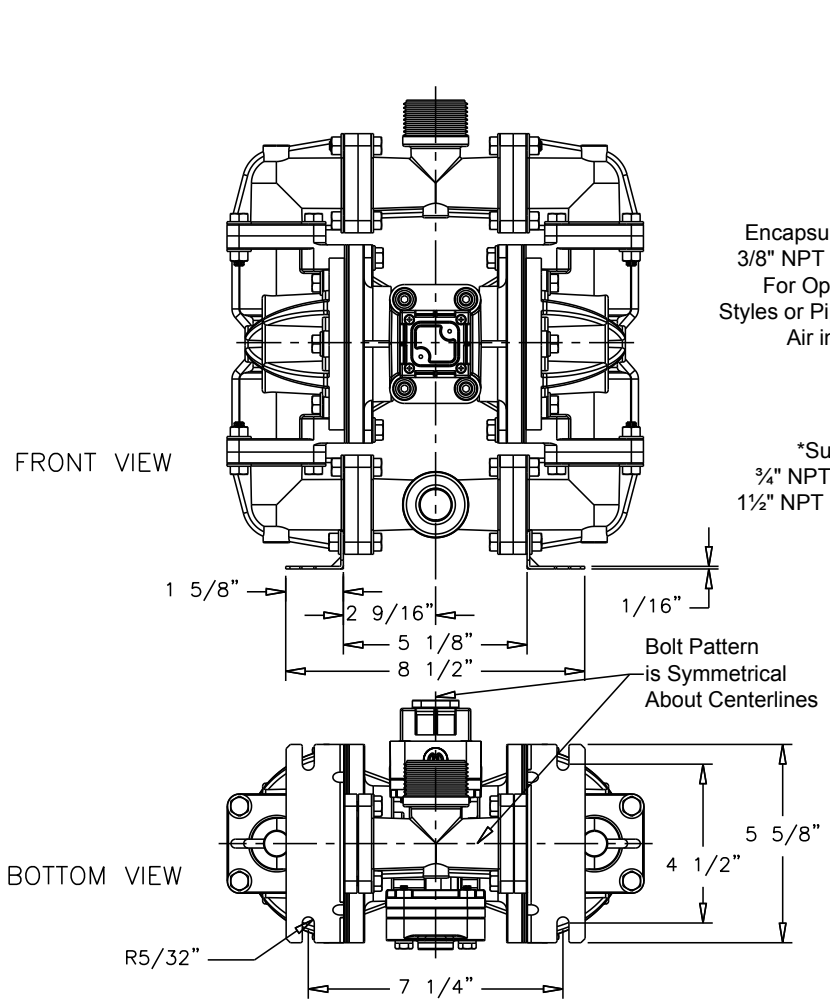


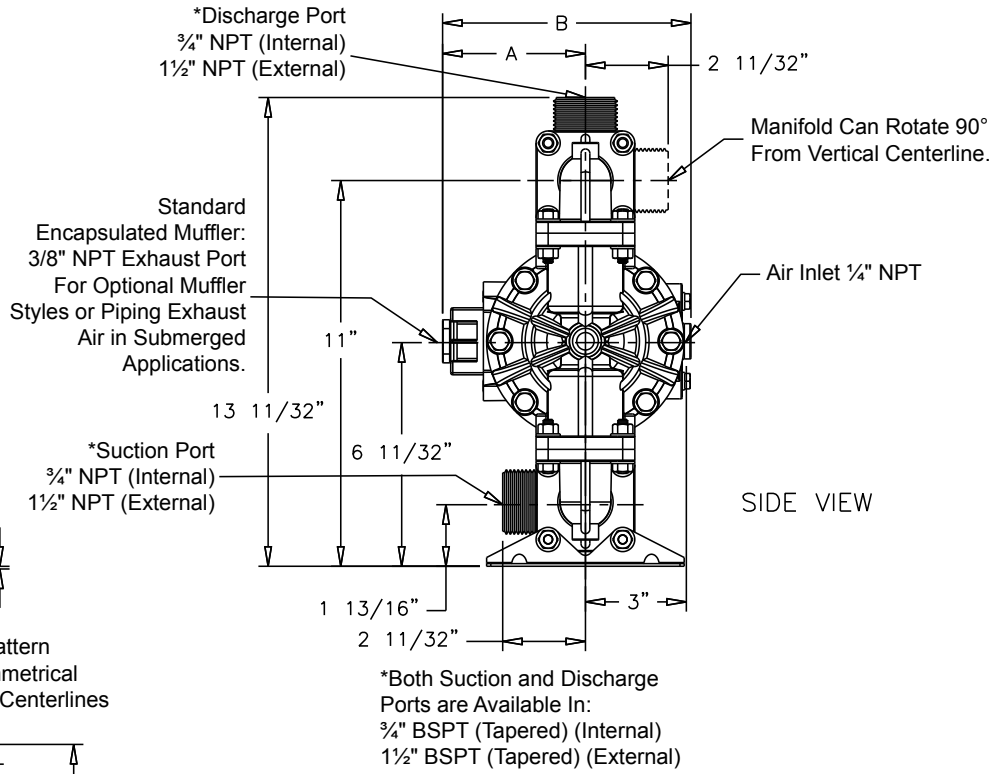
S07 Non-Metallic Performance Curve, Trihedral Model



Dimensions: S07 Non-Metallic

Dimensions in Inches
Dimensional tolerance: ±1/8"

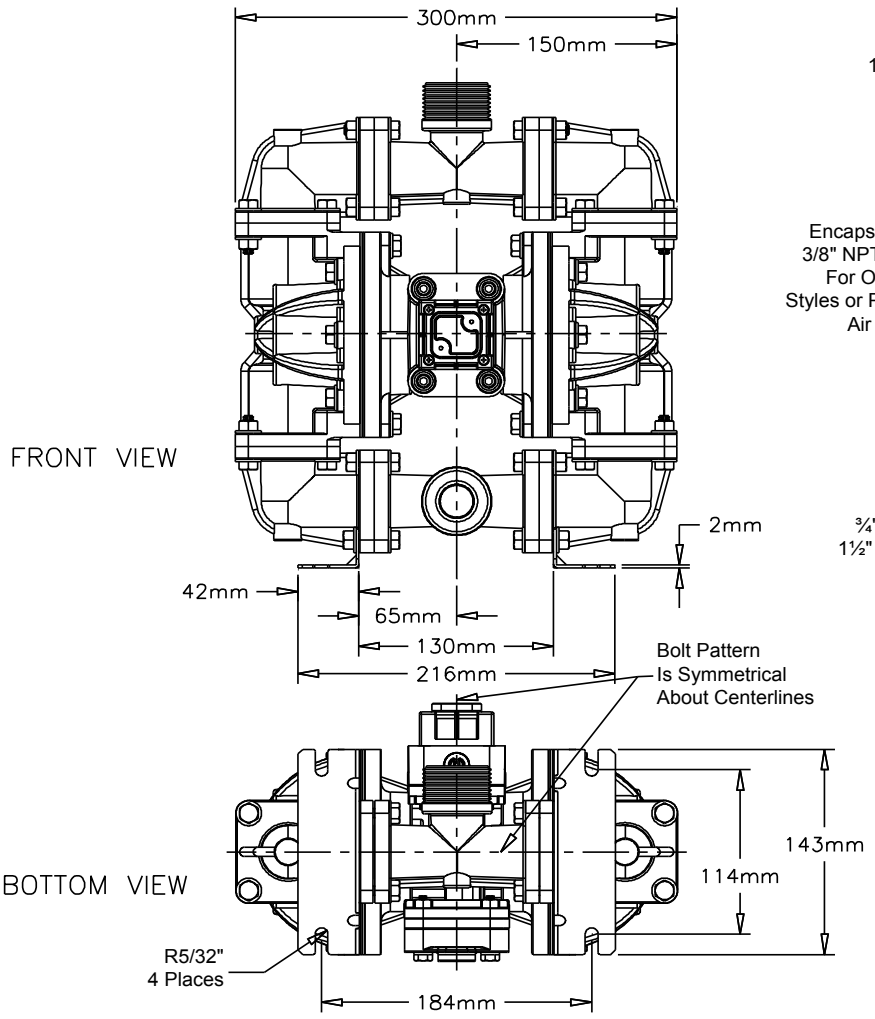


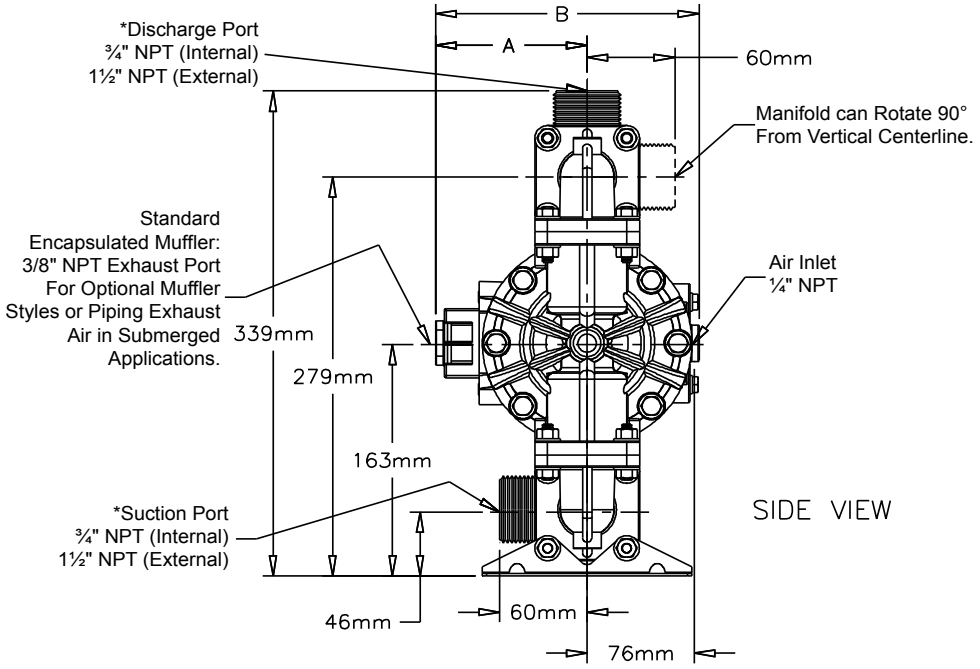


Dimension	A	B
Standard Pump	4 1/16"	7 1/16"
Pulse Output Kit	4 1/16"	7 1/16"
Mesh Muffler	5 3/4"	9 15/16"

Metric Dimensions: S07 Non-Metallic

Dimensions in Millimeters
Dimensional tolerance: ±3mm





*Both Suction and
Discharge Ports are
Available In:
¾" BSPT (Tapered) (Internal)
1½" BSPT (Tapered) (External)

Dimension	A	B
Standard Pump	103mm	179mm
Pulse Output Kit	103mm	224mm
Mesh Muffler	146mm	222mm

PRINCIPLE OF PUMP OPERATION

This ball type check valve pump is powered by compressed air and is a 1:1 ratio design. The inner side of one diaphragm chamber is alternately pressurized while simultaneously exhausting the other inner chamber. This causes the diaphragms, which are connected by a common rod secured by plates to the centers of the diaphragms, to move in a reciprocating action. (As one diaphragm performs the discharge stroke the other diaphragm is pulled to perform the suction stroke in the opposite chamber.) Air pressure is applied over the entire inner surface of the diaphragm while liquid is discharged from the opposite side of the diaphragm. The diaphragm operates in a balanced condition during the discharge stroke which allows the pump to be operated at discharge heads over 200 feet (61 meters) of water.

For maximum diaphragm life, keep the pump as close to the liquid being pumped as possible. Positive suction head in excess of 10 feet of liquid (3.048 meters) may require a back pressure regulating device to maximize diaphragm life.

Alternate pressurizing and exhausting of the diaphragm chamber is performed by an externally mounted, pilot operated, four way spool type air distribution valve. When the spool shifts to one end of the valve body, inlet pressure is applied to one diaphragm chamber and the other diaphragm chamber exhausts. When the spool shifts to the opposite end of the valve body, the pressure to the chambers is reversed. The air distribution valve spool is moved by a internal pilot valve which alternately pressurizes one end of the air distribution valve spool while exhausting the other end. The pilot valve is shifted at each end of the diaphragm stroke when a actuator plunger is contacted by the diaphragm plate. This actuator plunger then pushes the end of the pilot valve spool into position to activate the air distribution valve.

The chambers are connected with manifolds with a suction and discharge check valve for each chamber, maintaining flow in one direction through the pump.

INSTALLATION AND START-UP

Locate the pump as close to the product being pumped as possible. Keep the suction line length and number of fittings to a minimum. Do not reduce the suction line diameter.

For installations of rigid piping, short sections of flexible hose should be installed between the pump and the piping. The flexible hose reduces vibration and strain to the pumping system. A surge suppressor is recommended to further reduce pulsation in flow.

AIR SUPPLY

Air supply pressure cannot exceed 100 psi (7 bar). Connect the pump air inlet to an air supply of sufficient capacity and pressure required for desired performance. When the air supply line is solid piping, use a short length of flexible hose not less than 1/2" (13mm) in diameter between the pump and the piping to reduce strain to the piping. The weight of the air supply line, regulators and filters must be supported by some means other than the air inlet cap. Failure to provide support for the piping may result in damage to the pump. A pressure regulating valve should be installed to insure air supply pressure does not exceed recommended limits.

AIR VALVE LUBRICATION

The air distribution valve and the pilot valve are designed to operate WITHOUT lubrication. This is the preferred mode of operation. There may be instances of personal preference or poor quality air supplies when lubrication of the compressed air supply is required. The pump air system will operate with properly lubricated compressed air supply. Proper lubrication requires the use of an air line lubricator (available from Warren Rupp) set to deliver one drop of SAE 10 non-detergent oil for every 20 SCFM (9.4 liters/sec.) of air the pump consumes at the point of operation. Consult the pump's published Performance Curve to determine this.

AIR LINE MOISTURE

Water in the compressed air supply can create problems such as icing or freezing of the exhaust air, causing the pump to cycle erratically or stop operating. Water in the air supply can be reduced by using a point-of-use air dryer to supplement the user's air drying equipment. This device removes water from the compressed air supply and alleviates the icing or freezing problems.

AIR INLET AND PRIMING

To start the pump, open the air valve approximately 1/2" to 3/4" turn. After the pump primes, the air valve can be opened to increase air flow as desired. If opening the valve increases cycling rate, but does not increase the rate of flow, cavitation has occurred. The valve should be closed slightly to obtain the most efficient air flow to pump flow ratio.

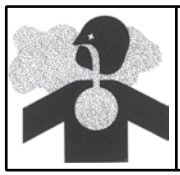
BETWEEN USES

When the pump is used for materials that tend to settle out or solidify when not in motion, the pump should be flushed after each use to prevent damage. (Product remaining in the pump between uses could dry out or settle out. This could cause problems with the diaphragms and check valves at restart.) In freezing temperatures the pump must be completely drained between uses in all cases.

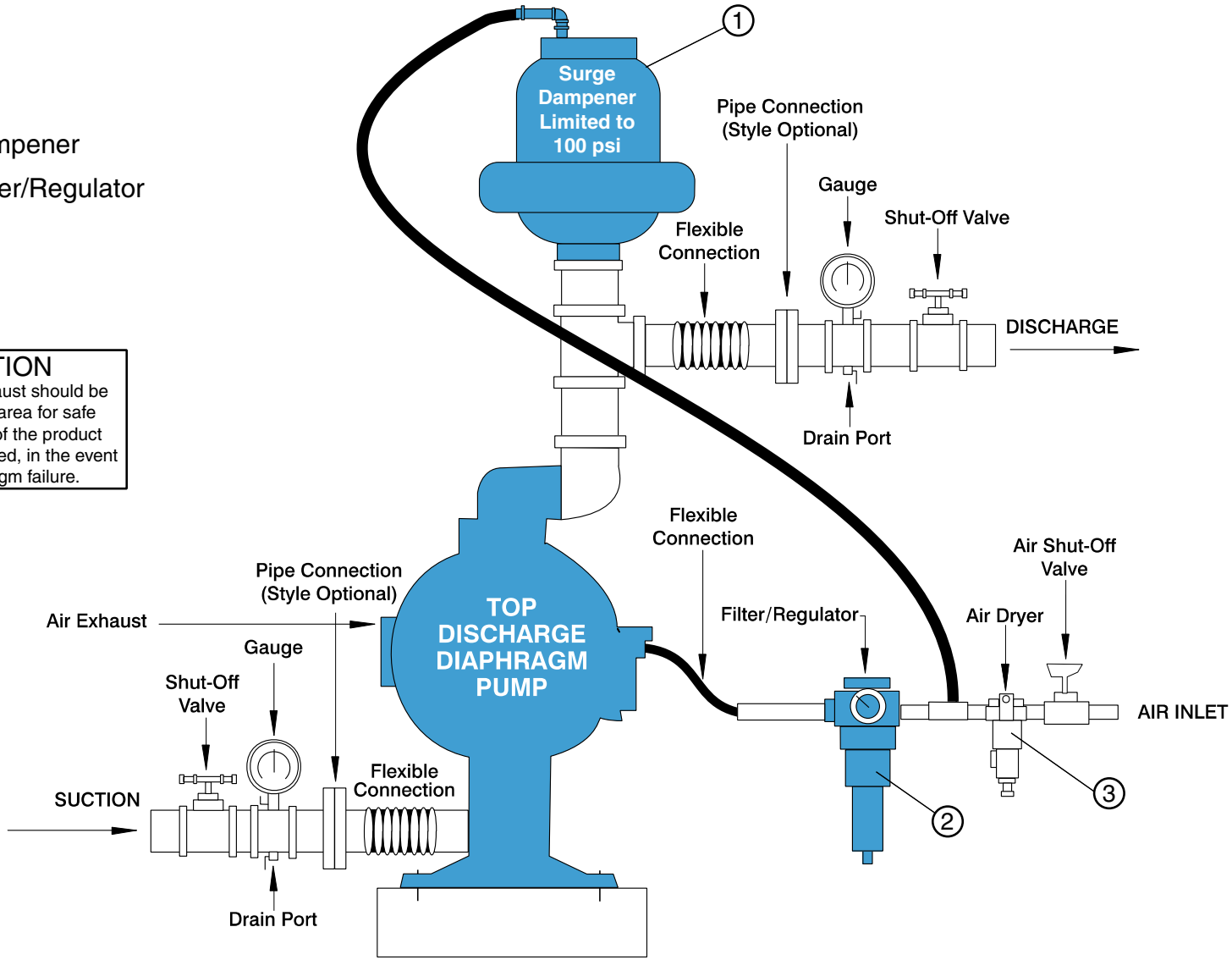
INSTALLATION GUIDE
Top Discharge Ball Valve Unit

Available from Warren Rupp

1. DA07 Surge Dampener
2. 020-049-000 Filter/Regulator
3. Air Dryer



⚠ CAUTION
The air exhaust should be piped to an area for safe disposition of the product being pumped, in the event of a diaphragm failure.



TROUBLESHOOTING

Possible Symptoms:

- Pump will not cycle.
- Pump cycles, but produces no flow.
- Pump cycles, but flow rate is unsatisfactory.
- Pump cycle seems unbalanced.
- Pump cycle seems to produce excessive vibration.

What to Check: Excessive suction lift in system.
Corrective Action: For lifts exceeding 20 feet (6 meters), filling the pumping chambers with liquid will prime the pump in most cases.

What to Check: Excessive flooded suction in system.
Corrective Action: For flooded conditions exceeding 10 feet (3 meters) of liquid, install a back pressure device.

What to Check: System head exceeds air supply pressure.
Corrective Action: Increase the inlet air pressure to the pump. Most diaphragm pumps are designed for 1:1 pressure ratio at zero flow.

What to Check: Air supply pressure or volume exceeds system head.
Corrective Action: Decrease inlet air pressure and volume to the pump as calculated on the published PERFORMANCE CURVE. Pump is cavitating the fluid by fast cycling.

What to Check: Undersized suction line.
Corrective Action: Meet or exceed pump connection recommendations shown on the DIMENSIONAL DRAWING.

What to Check: Restricted or undersized air line.
Corrective Action: Install a larger air line and connection. Refer to air inlet recommendations shown in your pump's SERVICE MANUAL.

What to Check: Check ESADS, the Externally Serviceable Air Distribution System of the pump.
Corrective Action: Disassemble and inspect the main air distribution valve, pilot valve and pilot valve actuators. Refer to the parts drawing and air valve section of the SERVICE MANUAL. Check for clogged discharge or closed valve before reassembly.

What to Check: Rigid pipe connections to pump.
Corrective Action: Install flexible connectors and a surge suppressor.

What to Check: Blocked air exhaust muffler.
Corrective Action: Remove muffler screen, clean or de-ice and reinstall. Refer to the Air Exhaust section of your pump SERVICE MANUAL.

What to Check: Pumped fluid in air exhaust muffler.
Corrective Action: Disassemble pump chambers. Inspect for diaphragm rupture or loose diaphragm plate assembly. Refer to the Diaphragm Replacement section of your pump SERVICE MANUAL.
What to Check: Suction side air leakage or air in product.
Corrective Action: Visually inspect all suction side gaskets and pipe connections.

What to Check: Obstructed check valve.
Corrective Action: Disassemble the wet end of the pump and manually dislodge obstruction in the check valve pocket. Refer to the Check Valve section of the pump SERVICE MANUAL for disassembly instructions.

What to Check: Worn or misaligned check valve or check valve seat.
Corrective Action: Inspect check valves and seats for wear and proper seating. Replace if necessary. Refer to Check Valve section of the pump SERVICE MANUAL for disassembly instructions.

What to Check: Blocked suction line.
Corrective Action: Remove or flush obstruction. Check and clear all suction screens and strainers.

What to Check: Blocked discharge line.
Corrective Action: Check for obstruction or closed discharge line valves.

What to Check: Blocked pumping chamber.
Corrective Action: Disassemble and inspect the wetted chambers of the pump. Remove or flush any obstructions. Refer to the pump SERVICE MANUAL for disassembly instructions.

What to Check: Entrained air or vapor lock in one or both pumping chambers.
Corrective Action: Purge chambers through tapped chamber vent plugs. PURGING THE CHAMBERS OF AIR CAN BE DANGEROUS! Contact the Warren Rupp Technical Service Team before performing this procedure. A model with top-ported discharge will reduce or eliminate problems with entrained air.

If your pump continues to perform below your expectations, contact your local Warren Rupp Distributor or factory Technical Service Team for a service evaluation.

WARRANTY

Refer to the enclosed Warren Rupp Warranty Certificate.

RECYCLING

Many components of SANDPIPER® AODD pumps are made of recyclable materials (see chart on page 9 for material specifications). We encourage pump users to recycle worn out parts and pumps whenever possible, after any hazardous pumped fluids are thoroughly flushed.

IMPORTANT SAFETY INFORMATION

⚠ IMPORTANT

Read these safety warnings and instructions in this manual completely, before installation and start-up of the pump. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

⚠ CAUTION

Before pump operation, inspect all gasketed fasteners for looseness caused by gasket creep. Re-torque loose fasteners to prevent leakage. Follow recommended torques stated in this manual.

⚠ CAUTION

Pump not designed, tested or certified to be powered by compressed natural gas. Powering the pump with natural gas will void the warranty.

⚠ WARNING

Before maintenance or repair, shut off the compressed air line, bleed the pressure, and disconnect the air line from the pump. The discharge line may be pressurized and must be bled of its pressure.

⚠ WARNING

Use safe practices when lifting

⚠ WARNING

In the event of diaphragm rupture, pumped material may enter the air end of the pump, and be discharged into the atmosphere. If pumping a product which is hazardous or toxic, the air exhaust must be piped to an appropriate area for safe disposition.

⚠ WARNING

Take action to prevent static sparking. Fire or explosion can result, especially when handling flammable liquids. The pump, piping, valves, containers or other miscellaneous equipment must be grounded.

⚠ WARNING

This pump is pressurized internally with air pressure during operation. Always make certain that all bolting is in good condition and that all of the correct bolting is reinstalled during assembly.

⚠ WARNING

When used for toxic or aggressive fluids, the pump should always be flushed clean prior to disassembly.

⚠ WARNING

Before doing any maintenance on the pump, be certain all pressure is completely vented from the pump, suction, discharge, piping, and all other openings and connections. Be certain the air supply is locked out or made non-operational, so that it cannot be started while work is being done on the pump. Be certain that approved eye protection and protective clothing are worn all times in the vicinity of the pump. Failure to follow these recommendations may result in serious injury or death.

⚠ WARNING

Airborne particles and loud noise hazards.

Wear ear and eye protection.

CE

Pump complies with EN809 Pumping Directive, Directive 2006/42/EC Machinery, according to Annex VIII. For reference to the declarations of conformity visit: warrenrupp.com.

Material Codes

The Last 3 Digits of Part Number

000	Assembly, sub-assembly; and some purchased items
010	Cast Iron
012	Powered Metal
015	Ductile Iron
020	Ferritic Malleable Iron
025	Music Wire
080	Carbon Steel, AISI B-1112
100	Alloy 20
110	Alloy Type 316 Stainless Steel
111	Alloy Type 316 Stainless Steel (Electro Polished)
112	Alloy C
113	Alloy Type 316 Stainless Steel (Hand Polished)
114	303 Stainless Steel
115	302/304 Stainless Steel
117	440-C Stainless Steel (Martensitic)
120	416 Stainless Steel (Wrought Martensitic)
123	410 Stainless Steel (Wrought Martensitic)
148	Hardcoat Anodized Aluminum
149	2024-T4 Aluminum
150	6061-T6 Aluminum
151	6063-T6 Aluminum
152	2024-T4 Aluminum (2023-T351)
154	Almag 35 Aluminum
155	356-T6 Aluminum
156	356-T6 Aluminum
157	Die Cast Aluminum Alloy #380
158	Aluminum Alloy SR-319
159	Anodized Aluminum
162	Brass, Yellow, Screw Machine Stock
165	Cast Bronze, 85-5-5-5
166	Bronze, SAE 660
170	Bronze, Bearing Type, Oil Impregnated
175	Die Cast Zinc
180	Copper Alloy
305	Carbon Steel, Black Epoxy Coated
306	Carbon Steel, Black PTFE Coated
307	Aluminum, Black Epoxy Coated
308	Stainless Steel, Black PTFE Coated
309	Aluminum, Black PTFE Coated
310	PVDF Coated
330	Zinc Plated Steel
331	Chrome Plated Steel
332	Aluminum, Electroless Nickel Plated
333	Carbon Steel, Electroless Nickel Plated
335	Galvanized Steel
336	Zinc Plated Yellow Brass
337	Silver Plated Steel
340	Nickel Plated
342	Filled Nylon
353	Geolast; Color: Black
354	Injection Molded #203-40 Santoprene-Duro 40D +/-5; Color: RED
355	Thermal Plastic
356	Hytrel
357	Injection Molded Polyurethane
358	Urethane Rubber (Some Applications) (Compression Mold)
359	Urethane Rubber
360	Nitrile Rubber. Color coded: RED
361	FDA Accepted Nitrile
363	FKM (Fluorocarbon). Color coded: YELLOW
364	E.P.D.M. Rubber. Color coded: BLUE
365	Neoprene Rubber. Color coded: GREEN
366	FDA Accpeted Nitrile
368	FDA Accpeted EPDM
370	Butyl Rubber. Color coded: BROWN
371	Philthane (Tuftane)
374	Carboxylated Nitrile
375	Fluorinated Nitrile
378	High Density Polypropylene
379	Conductive Nitrile
405	Cellulose Fibre
408	Cork and Neoprene
425	Compressed Fibre
426	Blue Gard
440	Vegetable Fibre
465	Fibre
500	Delrin 500
501	Delrin 570
502	Conductive Acetal, ESD-800
503	Conductive Acetal, Glass-Filled
505	Acrylic Resin Plastic
506	Delrin 150
520	Injection Molded PVDF Natural color
521	Conductive PVDF
540	Nylon
541	Nylon
542	Nylon
544	Nylon Injection Molded
550	Polyethylene
551	Glass Filled Polypropylene
552	Unfilled Polypropylene
553	Unfilled Polypropylene
555	Polyvinyl Chloride
556	Black Vinyl
557	Conductive Polypropylene
558	Conductive HDPE
559	Glass-Filled Conductive Polypropylene
570	Rulon II
580	Ryton
590	Valox
591	Nylatron G-S
592	Nylatron NSB
600	PTFE (virgin material) Tetrafluorocarbon (TFE)
601	PTFE (Bronze and moly filled)
602	Filled PTFE
603	Blue Gylon
604	PTFE
606	PTFE
607	Envelon
608	Conductive PTFE
610	PTFE Integral Silicon
611	PTFE Integral FKM
632	Neoprene/Hytrel
633	FKM (Fluorocarbon)/PTFE
634	EPDM/PTFE
635	Neoprene/PTFE
637	PTFE, FKM (Fluorocarbon)/PTFE
638	PTFE, Hytrel/PTFE
639	Nitrile/TFE
643	Santoprene/EPDM
644	Santoprene/PTFE
650	Bonded Santoprene and PTFE
654	Santoprene Diaphragm, PTFE Overlay Balls and seals
656	Santoprene Diaphragm and Check Balls/EPDM Seats
661	EPDM/Santoprene

Delrin and Hytrel are registered tradenames of E.I. DuPont.

Gylon is a registered tradename of Garlock, Inc.

Nylatron is a registered tradename of Polymer Corp.

Santoprene is a registered tradename of Monsanto Corp.

Rulon II is a registered tradename of Dixion Industries Corp.

Ryton is a registered tradename of Phillips Chemical Co.

Valox is a registered tradename of General Electric Co.

Warren Rupp, SANDPIPER, Portapump, Tranquilizers and SludgeMaser are registered tradenames of IDEX AODD, Inc.

Composite Repair Parts Drawing

AVAILABLE SERVICE AND CONVERSION KITS

476-219-000 **AIR END KIT**
Seals, O-rings, Gaskets, Bumpers Retaining Rings, Air Valve Assembly and Pilot Valve Assembly.

476-220-000 **AIR END KIT**
for pumps equipped with Stroke Indicator (same components as above, except Valve Assembly with pins replaces Air Valve Standard).

476-166-354 **WETTED END KIT**
Santoprene Diaphragms, Nitrile Spacer Gaskets, Santoprene Check Balls and TFE Seals.

476-166-357 **WETTED END KIT**
Polyurethane Diaphragms, Nitrile Spacer Gaskets, Polyurethane Check Balls and TFE Seals.

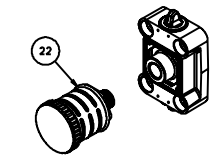
476-166-650 **WETTED END KIT**
PTFE/Santoprene Bond Diaphragm, PTFE Check Balls and PTFE Seals.

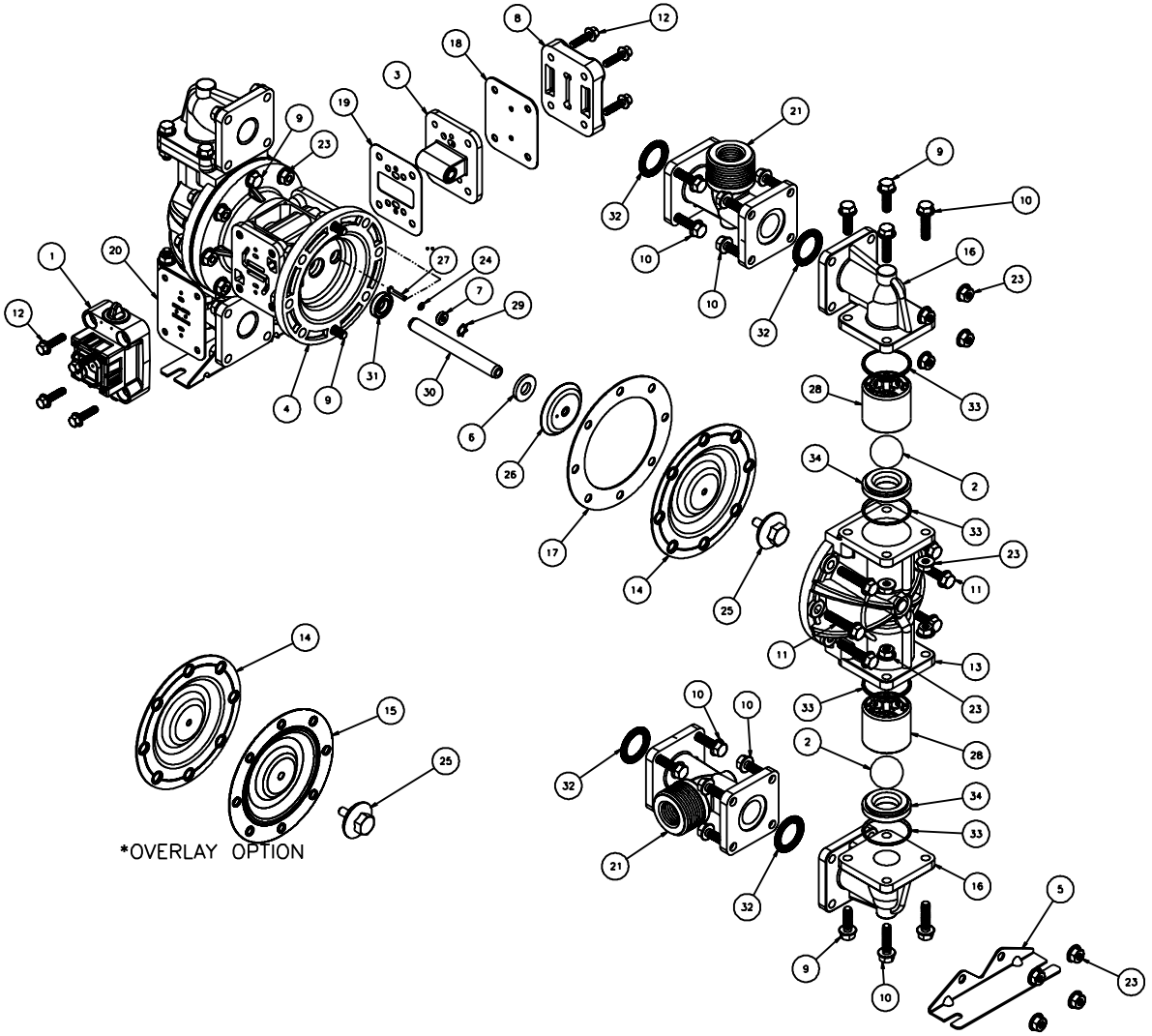
476-166-654 **WETTED END KIT**
Santoprene Diaphragms, TFE Overlay Diaphragm, TFE Check Balls and TFE Seals.

476-180-657 **WETTED END KIT** (S07T)
Santoprene Diaphragms, Nitrile Trihedral Valve Components, Nitrile Spacer Gaskets, and TFE Manifold Seals.

476-180-658 **WETTED END KIT** (S07T)
Santoprene Backup Diaphragms, TFE Overlay Diaphragms, FKM Trihedral Valve Components, and TFE Manifold Seals.

476-180-360 **WETTED END KITS** (S07T)
Nitrile Diaphragms, Nitrile Trihedral Valves, PTFE Seals.



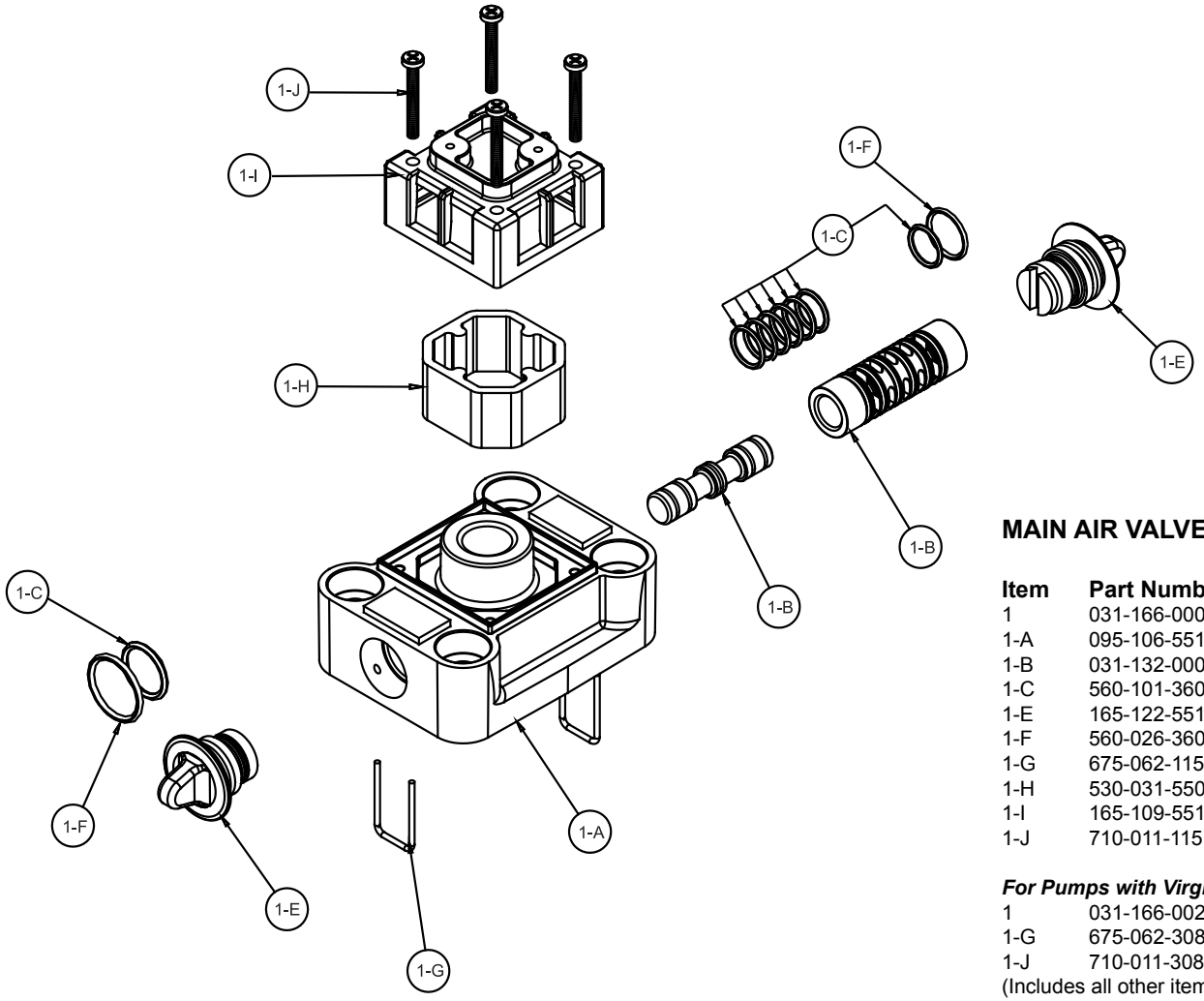


Composite Repair Parts List

NOTE: See Pages 14 and 16 For Full Explanation of Air Valve Options.

ITEM	PART NUMBER	DESCRIPTION	QTY
1	031-166-000	Air Valve Assembly (Integral Muffler)	1
	031-166-002	Air Valve Assembly (with PTFE Coated Hardware)	1
	031-167-000	Air Valve Assembly (with stroke Indicator Pins)	1
	031-167-002	Air Valve Assembly (with Stroke Indicator Pins and PTFE Coated Hardware)	1
	031-168-000	Air Valve Assembly (Optional Mufflers)	1
	031-169-000	Air Valve Assembly (Stroke Indicator & Optional Mufflers)	1
	031-176-000	Air Valve (High Temperature)	1
	031-177-000	Air Valve (High Temperature With Mufflers)	1
2	050-028-354	Ball, Check Valve	4
	050-028-357	Ball, Check Valve	4
	050-028-600	Ball, Check Valve	4
3	095-091-000	Pilot Valve Assembly	1
	095-091-003	Pilot Valve Assembly (Conductive Acetal)	1
4	114-023-551	Bracket, Intermediate	1
5	115-141-115	Bracket, Mounting	2
6	132-034-360	Bumper, Diaphragm	2
7	135-036-506	Bushing, Plunger	2
8	165-110-551	Cap, Air Inlet	1
9	171-062-115	Capscrew, Flanged 5/16-18 x 1.00	8
	171-062-308	Capscrew, Flanged 5/16-18 x 1.00	8
	171-075-115	Capscrew, Flanged 5/16-18 x 1.00	4
10	171-063-115	Capscrew, Flanged 5/16-18 x 1.25	24
	171-063-308	Capscrew, Flanged 5/16-18 x 1.25	24
11	171-064-115	Capscrew, Flanged 5/16-18 x 1.50	12
	171-064-308	Capscrew, Flanged 5/16-18 x 1.50	12
12	171-066-115	Capscrew, Flanged 1/4-20 x 1.25	8
	171-066-308	Capscrew, Flanged 1/4-20 x 1.25	8
13	196-162-520	Chamber, Outer	2
	196-162-542	Chamber, Outer	2
	196-162-552	Chamber, Outer	2
14	286-095-354	Diaphragm	2
	286-095-360	Diaphragm	2
	286-116-000	Diaphragm, One-Piece Bonded	2
15	286-096-600	Diaphragm, Overlay	2
16	312-107-520	Elbow	4
	312-107-542	Elbow	4
	312-107-552	Elbow	4
17	360-099-360	Gasket, Spacer (Use with TPE Diaphragms Only)	2
18	360-100-360	Gasket, Air Inlet	1
19	360-101-360	Gasket, Pilot Valve	1
20	360-102-360	Gasket, Air Valve	1
21	518-139-520	Manifold (NPT)	2
	518-139-520E	Manifold (BSPT), tapered	2
	518-139-542	Manifold (NPT)	2
	518-139-542E	Manifold (BSPT), tapered	2
	518-139-552	Manifold (NPT)	2
	518-139-552E	Manifold (BSPT), tapered	2
22	530-023-000	Muffler	1
	530-024-000	Muffler	1
23	544-005-115	Nut, Flanged 5/16-18	36
	544-005-308	Nut, Flanged 5/16-18	36
24	560-001-360	O-ring	2
25	612-091-520	Plate, Outer Diaphragm	2
	612-091-542	Plate, Outer Diaphragm	2
	612-091-552	Plate, Outer Diaphragm	2
26	612-177-330	Plate, Inner Diaphragm	2
	612-221-330	Plate, Inner (use with 2 One-Piece Bonded Diaphragm Only)	2
27	620-019-115	Plunger, Actuator	2
28	670-050-520	Retainer, Ball	4
	670-050-542	Retainer, Ball	4
	670-050-552	Retainer, Ball	4
29	675-042-115	Ring, Retaining	2
30	685-056-120	Rod, Diaphragm	1
31	720-012-360	Seal, Diaphragm Rod	2
32	720-046-600	Seal, Manifold	4
33	720-051-600	Seal, Check Valve Retainer	8
34	722-081-520	Seat, Check Valve	4
	722-081-542	Seat, Check Valve	4
	722-081-552	Seat, Check Valve	4
NOT SHOWN:			
	535-069-000	Nameplate	

Air Distribution Valve Assembly Drawing



MAIN AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
1	031-166-000	Air Valve Assembly	1
1-A	095-106-551	Body, Air Valve	1
1-B	031-132-000	Sleeve and Spool Set	1
1-C	560-101-360	O-Ring	8
1-E	165-122-551	End Cap	2
1-F	560-026-360	O-Ring	2
1-G	675-062-115	End Cap Retainer	2
1-H	530-031-550	Muffler	1
1-I	165-109-551	Muffler Cap	1
1-J	710-011-115	Self-Tapping Screw	4

For Pumps with Virgin PTFE coated hardware:

1	031-166-002	Air Valve Assembly	1
1-G	675-062-308	End Cap Retainer	2
1-J	710-011-308	Self Tapping Screw	4

(Includes all other items used on 031-166-000 above)

For Pumps with alternate Mesh or Sound Dampening Mufflers or Piped Exhaust:

1	031-168-000	Air Valve Assembly	1

(Includes all items used on 031-166-000 above minus 1-H, 1-I and 1-J)

AIR DISTRIBUTION VALVE SERVICING

To service the air valve first shut off the compressed air, bleed pressure from the pump, and disconnect the air supply line from the pump.

STEP #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 3/8" wrench or socket, remove the four hex flanged capscrews (item 12). Remove the air valve assembly from the pump.

STEP #2: Disassembly of the air valve.

To access the internal air valve components first remove the two end cap retainers (item 1-G) by inserting a small flat screwdriver into the two slotted grooves on the valve body and gently lifting the retainers out.

Next remove the two end caps (item 1-E) by grasping the pull tab with finger and thumb or pliers and tugging. Inspect the two o-rings (items 1-C and 1-F) on each end cap for wear or cuts. Replace the o-rings if necessary.

Remove the spool (part of item 1-B) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft clean cloth and inspect for scratches or abrasive wear.

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B). **Note:** The sleeve and spool set is match-ground to a specified clearance. Sleeves and spools cannot be interchanged.

STEP #3: Reassembly of the air distribution valve.

Install one end cap with o-rings (items 1-E, 1-C, and 1-F) into one end of the air valve body (item 1-A). Insert one end cap retainer (item 1-G) into the two smaller holes, align with groove in the end cap, and push until the closed end of the retainer is below the flat surface of the valve body.

Remove the new sleeve and spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-C) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body. Align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Push the spool in until the pin touches the end cap on the opposite end.

Install the remaining end cap with o-rings and retainer.

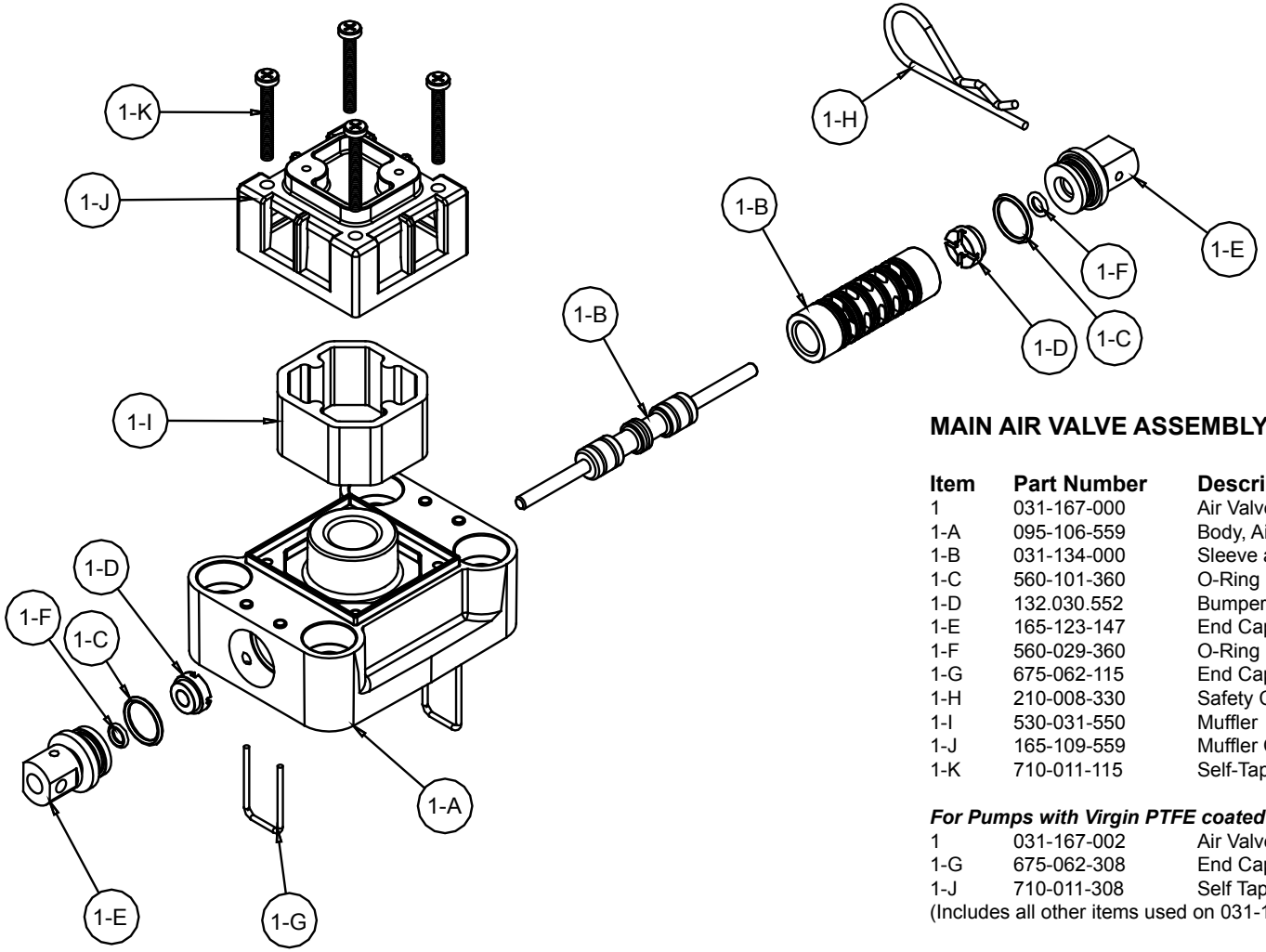
Fasten the air valve assembly (item 1) and gasket (item 23) to the pump, using the four hex flanged capscrews (item 12).

Connect the compressed air line to the pump. The pump is now ready for operation.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Air Valve with Stroke Indicator Assembly Drawing, Parts List



MAIN AIR VALVE ASSEMBLY PARTS LIST

Item	Part Number	Description	Qty
1	031-167-000	Air Valve Assembly	1
1-A	095-106-559	Body, Air Valve	1
1-B	031-134-000	Sleeve and Spool Set	1
1-C	560-101-360	O-Ring	8
1-D	132.030.552	Bumper	2
1-E	165-123-147	End Cap	2
1-F	560-029-360	O-Ring	2
1-G	675-062-115	End Cap Retainer	2
1-H	210-008-330	Safety Clip	1
1-I	530-031-550	Muffler	1
1-J	165-109-559	Muffler Cap	1
1-K	710-011-115	Self-Tapping Screw	4

For Pumps with Virgin PTFE coated hardware:

1	031-167-002	Air Valve Assembly	1
1-G	675-062-308	End Cap Retainer	2
1-J	710-011-308	Self Tapping Screw	4

(Includes all other items used on 031-166-000 above)

For Pumps with alternate Mesh or Sound Dampening Mufflers or Piped Exhaust:

1	031-169-000	Air Valve Assembly	1

(Includes all items used on 031-167-000 above minus 1-H, 1-I and 1-J)

AIR DISTRIBUTION VALVE WITH STROKE INDICATOR OPTION SERVICING

To service the air valve first shut off the compressed air, bleed pressure from the pump, and disconnect the air supply line from the pump.

STEP #1: See COMPOSITE REPAIR PARTS DRAWING.

Using a 3/8" wrench or socket, remove the four hex flanged capscrews (item 12). Remove the air valve assembly from the pump.

STEP #2: Disassembly of the air valve.

To access the internal air valve components first remove the two end cap retainers (item 1-G) by inserting a small flat screwdriver into the two slotted grooves on the valve body and gently lifting the retainers out.

Next remove the two end caps (item 1-E) by grasping the pull tab with finger and thumb or pliers and tugging. Inspect the two o-rings (items 1-C and 1-F) on each end cap for wear or cuts. Replace the o-rings if necessary.

Remove the spool (part of item 1-B) from the sleeve. Be careful not to scratch or damage the outer diameter of the spool. Wipe spool with a soft clean cloth and inspect for scratches or abrasive wear.

Inspect the inner diameter of the sleeve (part of item 1-B) for dirt, scratches, or other contaminants. Remove the sleeve if needed and replace with a new sleeve and spool set (item 1-B). **Note:** The sleeve and spool set is match-ground to a specified clearance. Sleeves and spools cannot be interchanged.

STEP #3: Reassembly of the air distribution valve.

Install one end cap with o-rings (items 1-E, 1-C, and 1-F) into one end of the air valve body (item 1-A). Insert one end cap retainer (item 1-G) into the two smaller holes, align with groove in the end cap, and push until the closed end of the retainer is below the flat surface of the valve body.

Remove the new sleeve and spool set (item 1-B) from the plastic bag. Carefully remove the spool from the sleeve. Install the six o-rings (item 1-C) into the six grooves on the sleeve. Apply a light coating of grease to the o-rings before installing the sleeve into the valve body. Align the slots in the sleeve with the slots in the valve body. Insert the spool into the sleeve. Be careful not to scratch or damage the spool during installation. Push the spool in until the pin touches the end cap on the opposite end.

Install the remaining end cap with o-rings and retainer.

Fasten the air valve assembly (item 1) and gasket (item 23) to the pump, using the four hex flanged capscrews (item 12).

Connect the compressed air line to the pump. The pump is now ready for operation.

IMPORTANT: Remove the safety clip. The pump will not function properly until it is removed. The pump is now ready for operation.

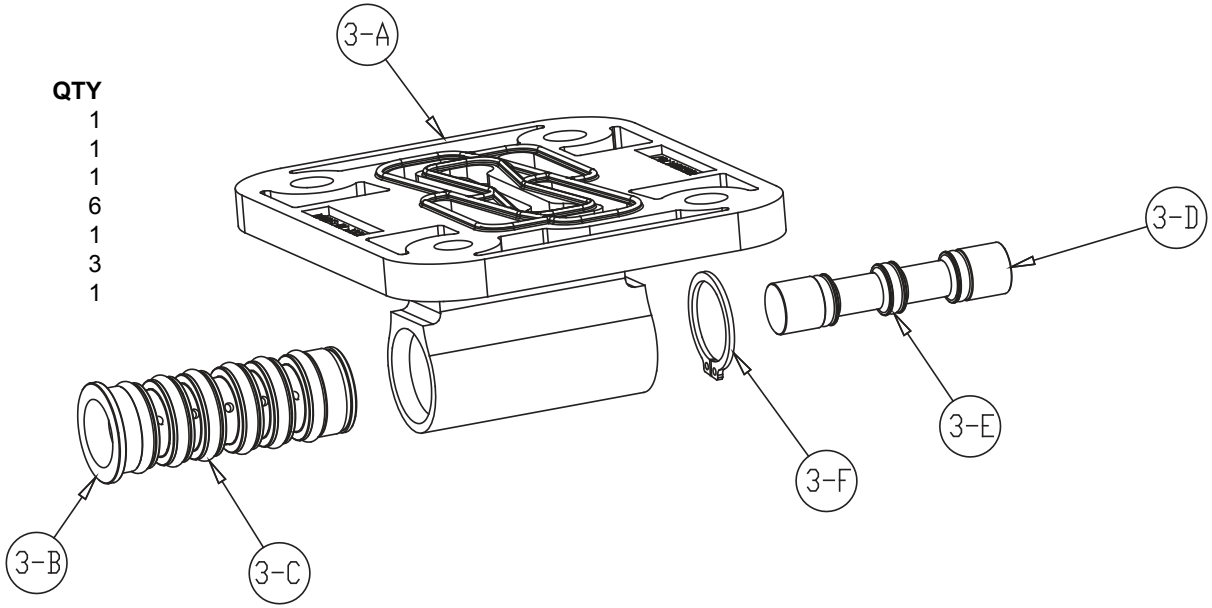
⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Pilot Valve Servicing, Assembly Drawing & Parts List

PILOT VALVE ASSEMBLY PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
3	095-091-000	Pilot Valve Assembly	1
3-A	095-087-551	Valve Body	1
3-B	755-051-000	Sleeve (With O-rings)	1
3-C	560-033-360	O-ring (Sleeve)	6
3-D	775-055-000	Spool (With O-rings)	1
3-E	560-023-360	O-ring (Spool)	3
3-F	675-037-080	Retaining Ring	1



PILOT VALVE SERVICING

To service the pilot valve first shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump.

STEP #1: See pump assembly drawing.

Using a 7/16" wrench or socket, remove the four capscrews (item 12). Remove the air inlet cap (item 8) and air inlet gasket (item 18). The pilot valve assembly (item 3) can now be removed for inspection and service.

STEP #2: Disassembly of the pilot valve.

Remove the pilot valve spool (item 3-D). Wipe clean and inspect spool and o-rings for dirt, cuts or wear. Replace the o-rings and spool if necessary.

Remove the retaining ring (item 3-F) from the end of the sleeve (item 3-b) and remove the sleeve from the valve body (item 3-A). Wipe clean and inspect sleeve and o-rings for dirt, cuts or wear. Replace the o-rings and sleeve if necessary.

STEP #3: Re-assembly of the pilot valve.

Generously lubricate outside diameter of the sleeve and o-rings. Then carefully insert sleeve into valve body. Take CAUTION when inserting sleeve, not to shear any o-rings. Install retaining ring to sleeve. Generously lubricate outside diameter of spool and o-rings. Then carefully insert spool into sleeve. Take CAUTION when inserting spool, not to shear any o-rings. Use BP-LS-EP-2 multipurpose grease, or equivalent.

STEP #4: Re-install the pilot valve assembly into the intermediate.

Be careful to align the ends of the pilot valve stem between the plunger pins when inserting the pilot valve into the cavity of the intermediate.

Re-install the gasket, air inlet cap and capscrews. Connect the air supply to the pump. The pump is now ready for operation.

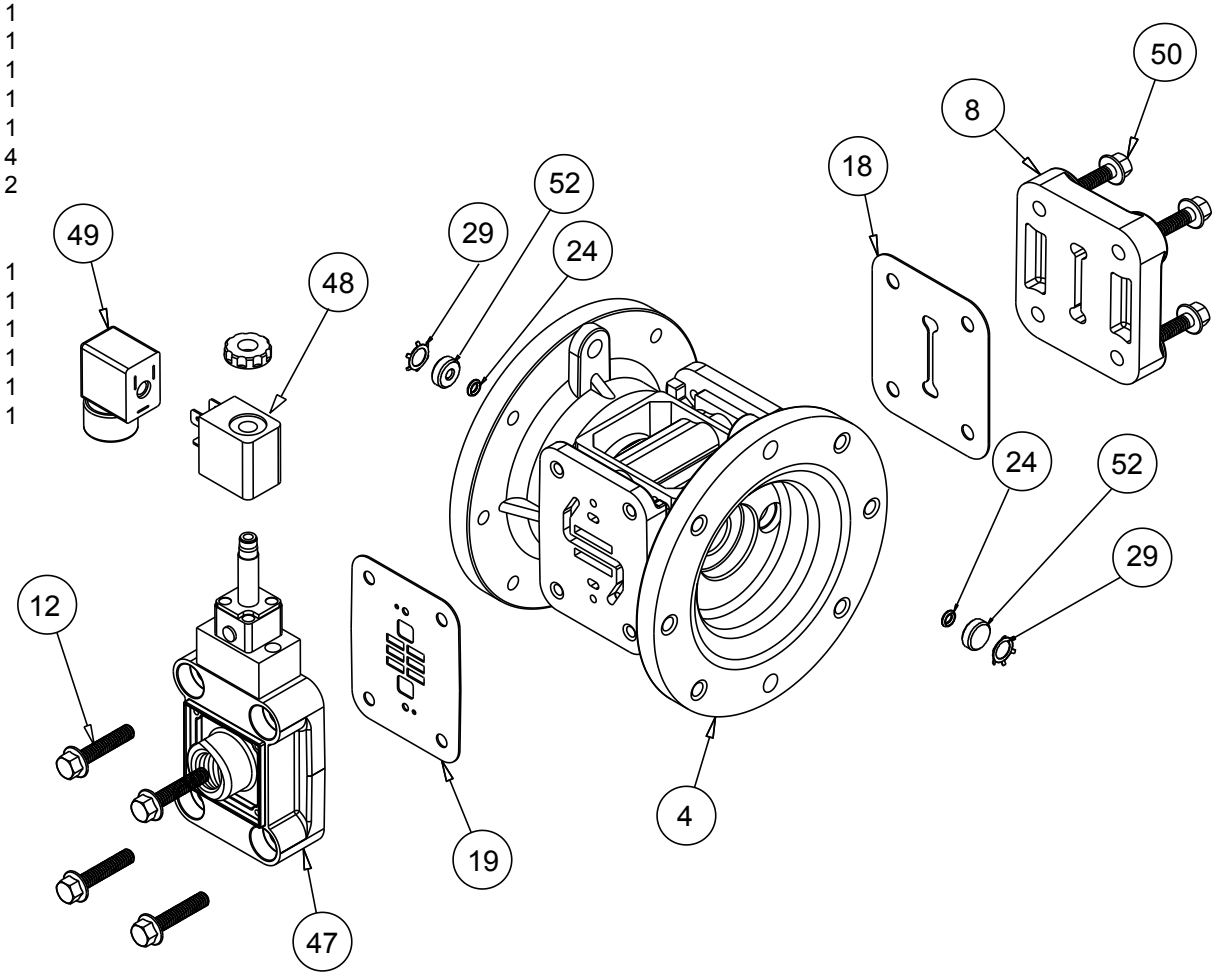
Solenoid Shifted Air Valve Drawing

SOLENOID SHIFTED AIR VALVE PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
4	114-023-551	Bracket, Intermediate	1
47	893-099-000	Solenoid Valve, NEMA4	1
48	219-001-000	Solenoid Coil, 24VDC	1
	219-004-000	Solenoid Coil, 24VAC/12VDC	1
	219-002-000	Solenoid Coil, 120VAC	1
	219-003-000	Solenoid Coil, 240VAC	1
49	241-001-000	Connector, Conduit	1
50	171-065-115	Capscrew, Flanged 1/4-20 x 1.00	4
52	618-050-150	Plug (Replaces item 7)	2

For Explosion Proof Solenoid Coils:

48	219-009-001	Solenoid Coil,120VAC 60Hz	1
	219-009-002	Solenoid Coil, 240VAC 60Hz	1
	219-009-003	Solenoid Coil,12VDC	1
	219-009-004	Solenoid Coil, 24VDC	1
	219-009-005	Solenoid Coil,110VAC 50Hz	1
	219-009-006	Solenoid Coil, 230VAC 50Hz	1



SOLENOID SHIFTED AIR DISTRIBUTION VALVE OPTION

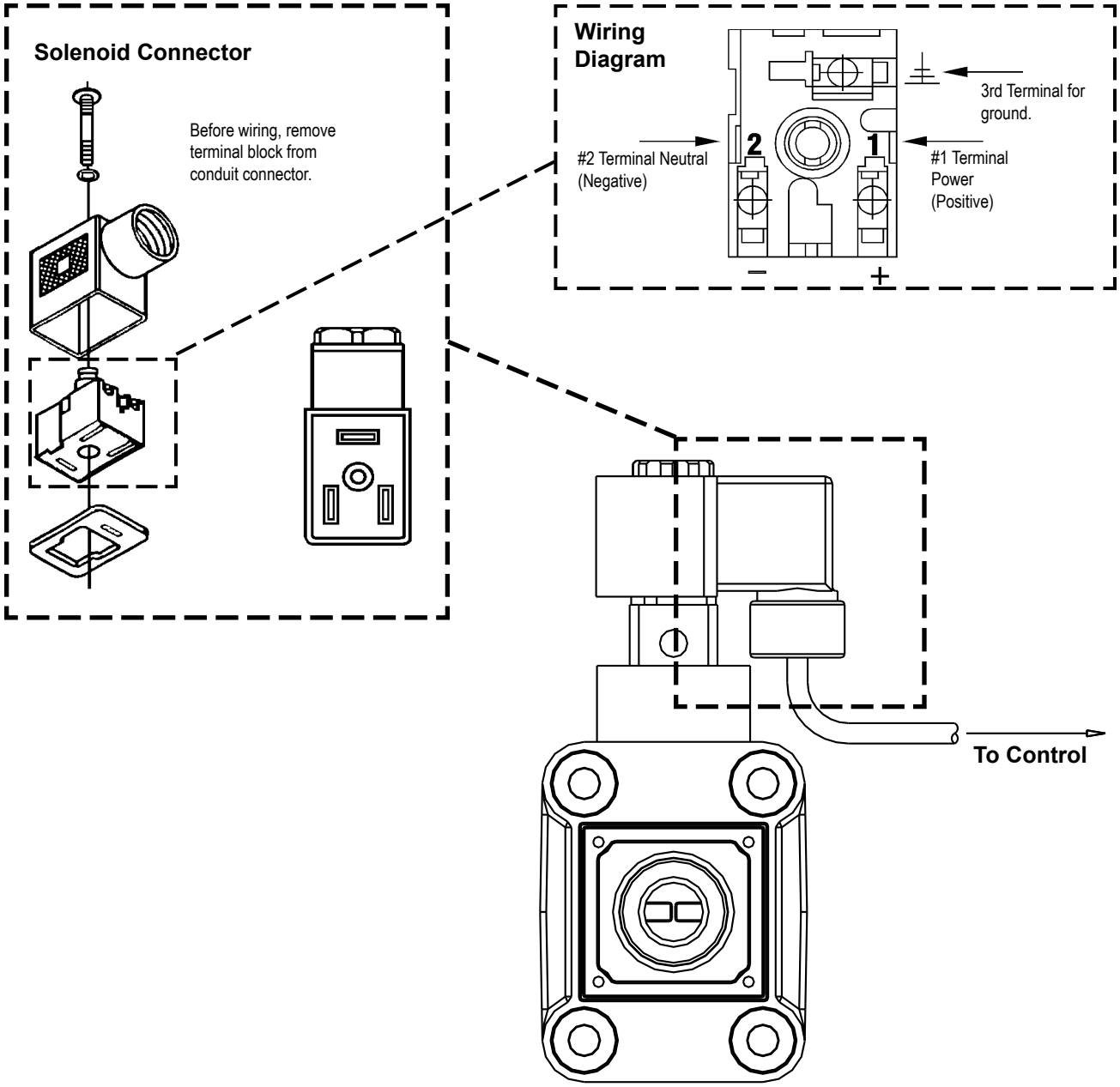
Warren Rupp's solenoid shifted, air distribution valve option utilizes electrical signals to precisely control your SANDPIPER's speed. The solenoid coil is connected to a customer - supplied control. Compressed air provides the pumping power, while electrical signals control pump speed (pumping rate).

OPERATION

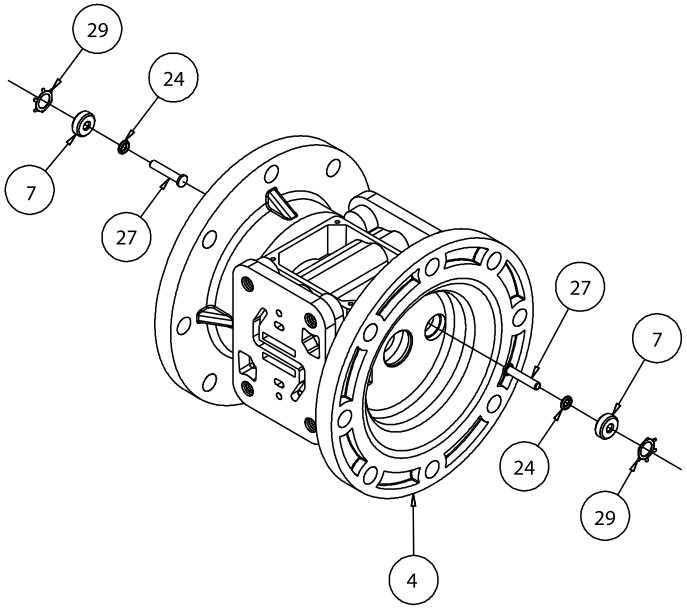
The Solenoid Shifted SANDPIPER has a solenoid operated, air distribution valve in place of the standard SANDPIPER's pilot operated, air distribution valve. Where a pilot valve is normally utilized to cycle the pump's air distribution valve, an electric solenoid is utilized. As the solenoid is powered, one of the pump's air chambers is pressurized while the other chamber is exhausted. When electric power is turned off, the solenoid shifts and the pressurized chamber is exhausted while the other chamber is pressurized. By alternately applying and removing power to the solenoid, the pump cycles much like a standard SANDPIPER pump, with one exception. This option provides a way to precisely control and monitor pump speed.

BEFORE INSTALLATION

Before wiring the solenoid, make certain it is compatible with your system voltage.



Intermediate Drawing



INTERMEDIATE ASSEMBLY REPAIR PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
4	114-023-551	Bracket, Intermediate	1
7	135-036-506	Bushing, Plunger	2
24	560-001-360	O-Ring	2
27	620-019-115	Plunger, Actuator	2
29	675-042-115	Ring, Retaining*	2

***NOTE:** It is recommended that when plunger components are serviced, new retaining rings be installed.

Intermediate Servicing

ACTUATOR PLUNGER SERVICING

To service the actuator plunger first shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump.

Step #1: See PUMP ASSEMBLY DRAWING.

Using a 3/8" wrench or socket, remove the four capscrews (items 12). Remove the air inlet cap (item 8) and air inlet gasket (item 20). The pilot valve assembly (item 3) can now be removed.

Step #2: Servicing the actuator plungers.

See PUMP ASSEMBLY DRAWING.

The actuator plungers (items 27) can be reached through the stem cavity of the pilot valve in the intermediate bracket (item 4). To service bushings, o-rings and retaining rings, see Intermediate Drawing.

Remove the plungers (items 27) from the bushings (item 7) in each end of the intermediate cavity. Inspect for wear or damage. Replace plunger as needed. Apply a light coating of grease to each o-ring and re-install the plungers in to the bushings. Push the plungers in as far as they will go.

Step #3: Re-install the pilot valve assembly into the intermediate assembly.

Be careful to align the ends of the stem between the plungers when inserting the stem of the pilot valve into the cavity of the intermediate.

Re-install the gasket (item 20), air inlet cap (item 8) and capscrews (items 12).

Connect the air supply to the pump. The pump is now ready for operation.

PLUNGER BUSHING, O-RING, AND RETAINING RING SERVICING

To service the plunger bushing components first remove the two retaining rings (items 29) using a small flat screwdriver. ***Note:** It is recommended that new retaining rings be installed.

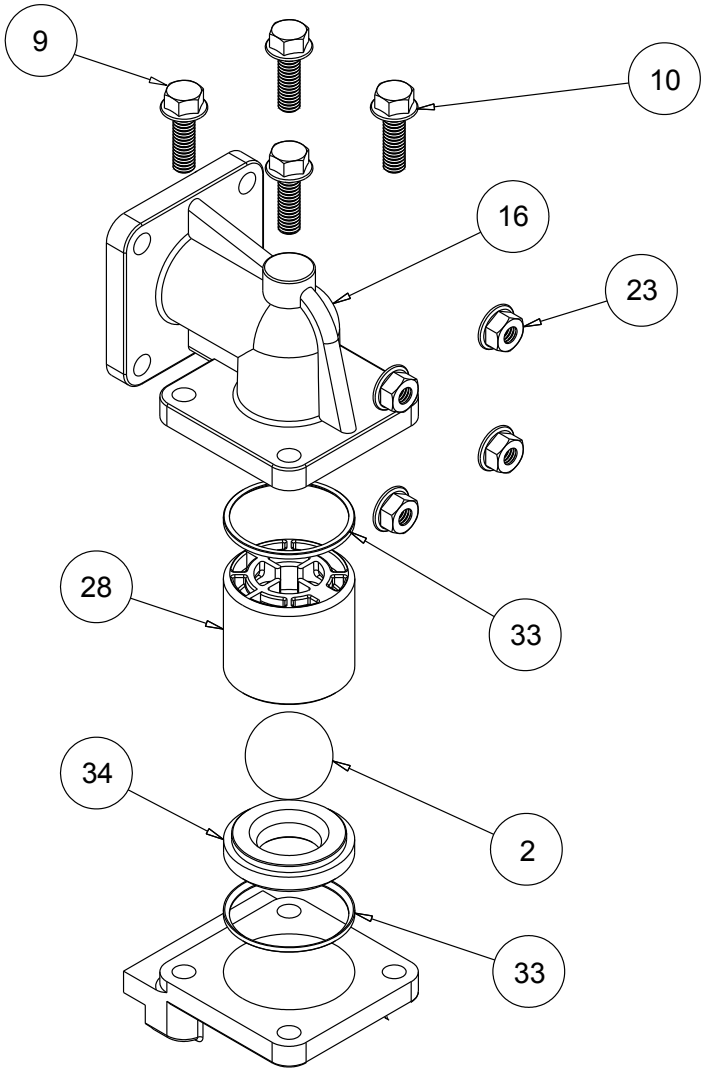
Next remove the two plunger bushings (items 7). Inspect the bushings for wear or scratches. Replace the bushings as necessary.

Inspect the two o-rings (24) for cuts and/or wear.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Modular Check Ball Valve Drawing



MODULAR CHECK BALL VALVE SERVICING

Before servicing the check valves, first shut off the suction line and then the discharge line to the pump. Next, shut off the compressed air supply, bleed air pressure from the pump, and disconnect the air supply line from the pump. Drain any remaining fluid from the pump. The pump can now be removed for service.

To access the modular check valve, remove the elbows (items 16 from pump composite repair parts drawing). Use a 1/2" wrench or socket to remove the fasteners. Once the elbows are removed, the modular check valves can be seen in the cavities of the outer chamber (items 13).

Next remove the check valve seal (item 33). Inspect the seal for cuts or pinched areas. Replace seal as needed.

Disassemble the component parts of each modular check valve. Inspect the check valve retainer (item 28) for cuts, abrasive wear, or embedded materials. Replace as needed.

Inspect the check balls (items 2) for wear, abrasion, or cuts on the spherical surface. The check valve seats (items 34) should be inspected for cuts, abrasive wear, or embedded material on the surfaces of both the external and internal chambers. The spherical surface of the check balls must seat flush to the surface of the inner chamfer on the check valve seats for the pump to operate to peak efficiency. Replace any worn or damaged parts as necessary.

Remove the check valve seal (item 33). Inspect the seal for cuts or pinched areas. Replace seal as needed.

RE-ASSEMBLE THE MODULAR CHECK VALVES.

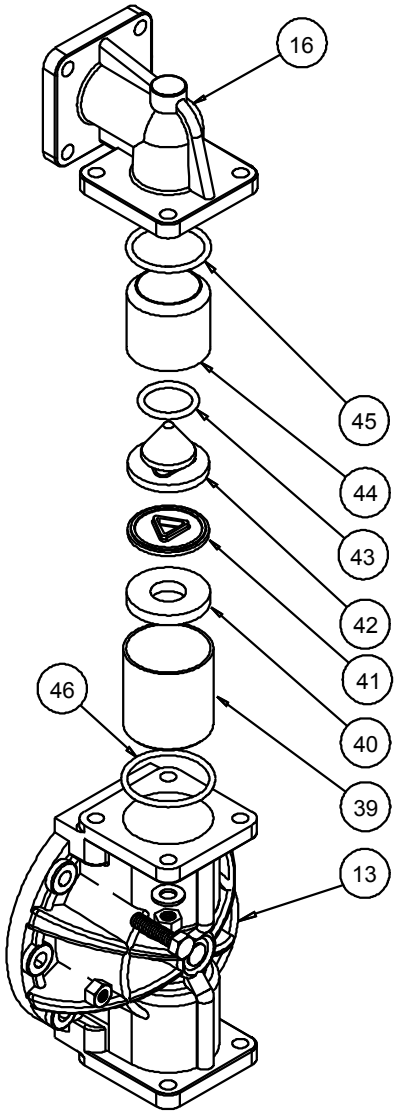
Place a check valve seal (item 33) into the cavity of the outer chamber (item 13). Make sure the chamfer side of the seal faces out. Insert the modular check valve into the outer chamber with the retainer facing up. Install a check valve seal (item 33). Make sure the chamfer side of the seals face the chamfer on the check valve seat or retainer.

The pump can now be reassembled, reconnected and returned to operation.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Modular Trihedral Check Valve Option Drawing



The following parts are not used:

ITEM	PART NUMBER	DESCRIPTION	QTY
2	050-028-354	Ball, Check	4
28	670-050-552	Retainer, Ball	4
34	722-081-552	Seat, Check Valve	4
33	720-051-600	Seat, Check Valve	8

These parts are used in place of the parts listed above:

39	430-048-552	Retainer, Housing	4
40	132-019-360	Bumper, Trihedral Valve	4
	132-019-363	Bumper, Trihedral Valve	4
41	449-005-551	Insert, Trihedral Valve	4
42	888-001-360	Valve, Trihedral	4
	888-001-363	Valve, Trihedral	4
43	560-025-360	O-Ring	4
	560-025-363	O-Ring	4
44	755-035-552	Sleeve, Trihedral Valve	4
45	560-014-360	O-Ring	4
	560-014-363	O-Ring	4
46	560-075-360	O-RIng	4
	560-075-363	O-Ring	4

MODULAR TRIHEDRAL CHECK VALVE SERVICING

Before servicing the trihedral valves, first shut off the suction line and then the discharge line to the pump. Next, shut off the compressed air supply, bleed air pressure from the pump, and disconnect the air supply line from the pump. Drain any remaining fluid from the pump. The pump can now be removed for service.

To access the modular trihedral valve, remove the elbows (items 16 from the pump composite repair parts drawing). Use a 1/2" wrench or socket to remove the fasteners. Once the elbows have been removed, the modular trihedral valves can be seen in the cavities of the outer chamber (items 13).

Next remove the o-rings (items 45 and 46). Inspect the o-rings for cuts, or pinched areas. Replace the o-rings as needed.

Disassemble the modular trihedral valves. Insert a finger through the hole in the bottom of each retainer housing (item 39) and push the remaining valve components out the top of the housing. Inspect the chamfers on the retainer housing for cuts, abrasive wear or embedded material. Replace the bushings as needed.

Remove the sealing bumper (item 40) from the trihedral valve sleeves (item 44). Inspect the bumper seals for cuts, abrasive wear, or embedded material. Replace the bumper seals as needed.

The trihedral valves (item 42) and valve inserts (item 41) can now be removed. Separate the valve insert from the elastomeric trihedral valve and inspect for cuts, abrasive wear, or embedded material. Replace the inserts as needed.

Inspect the trihedral valves for cuts, abrasive wear, or embedded material. Replace the trihedal valves as needed.

RE-ASSEMBLE THE VALVES

Install the trihedral valve inserts into the trihedral valves. Push the assembled trihedral valves into the valve sleeves until they stop on the counter bore in the sleeves. Next insert the bumper seals into the sleeves.

Install the assembled valves, sleeves and bumper seals into the retainer housings with the bumper seals facing the bottom of the housing.

SUCTION END VALVES

Install an o-ring (item 45) into the groove created between the sleeve and the housing and insert the assembly into the counterbore on the suction end (bottom) of each outer chamber. Align an o-ring (item 46) with the chamfers on the retainer housings and counterbores of each chamber and install the suction elbows.

DISCHARGE END VALVES

Install an o-ring (item 46) into the counterbore on the discharge end (top) of each outer chamber.

Insert the assembled housing, bottom end down, until the exterior chamfer touches the installed o-ring.

Install an o-ring (item 45) into the groove created between the sleeve and the housing.

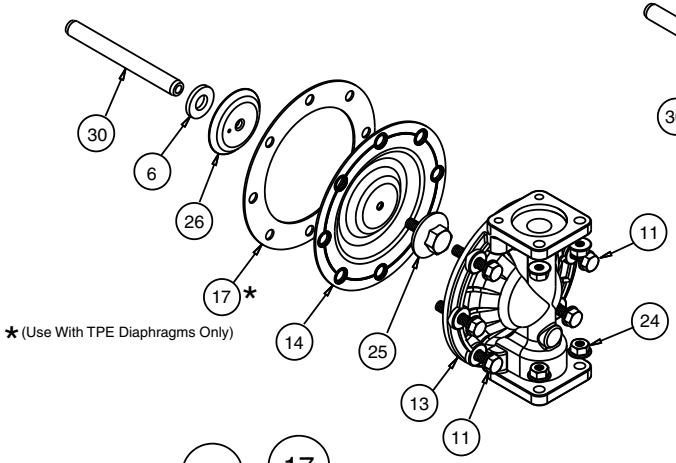
Fasten the discharge elbows to the outer chamber.

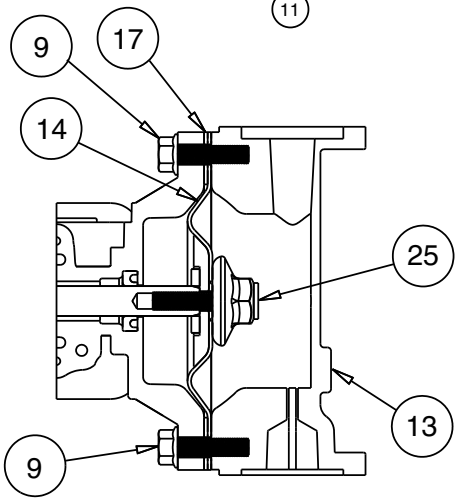
The pump can now be reassembled. reconnected, and returned to operation.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Diaphragm Service Drawing

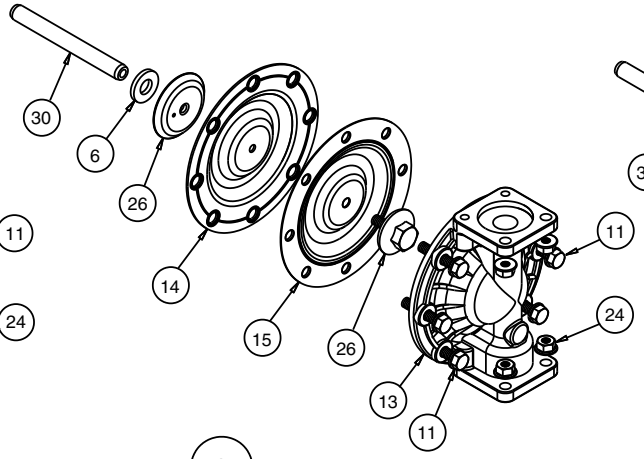


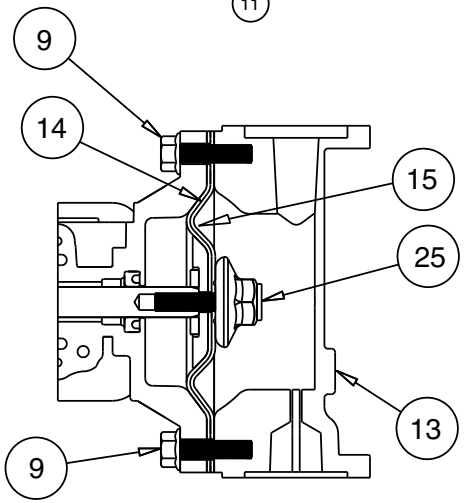


Diaphragm Orientation

Install diaphragm and spacer as shown above.

Diaphragm Service Drawing, with Overlay

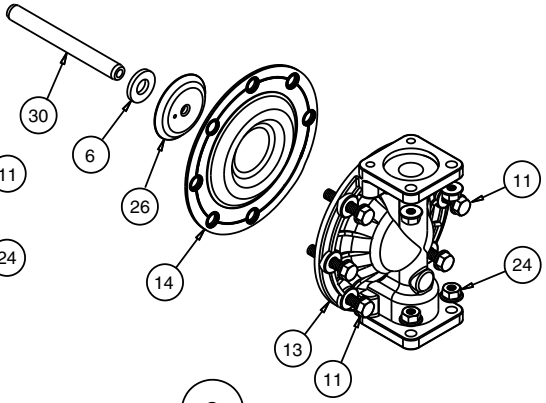


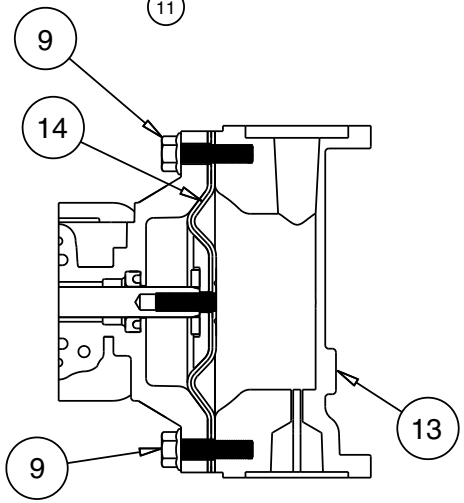


Diaphragm Orientation

Install diaphragm and overlay as shown above.

Diaphragm Service Drawing with One-Piece Bonded





Diaphragm Orientation

Install diaphragm (286-116-000 only) as shown above.

DIAPHRAGM SERVICING

To service the diaphragms first shut off the suction, then shut off the discharge lines to the pump. Shut off the compressed air supply, bleed the pressure from the pump, and disconnect the air supply line from the pump. Drain any remaining liquid from the pump.

Step #1: See the pump composite repair parts drawing, and the diaphragm servicing illustration.

Using a 1/2" wrench or socket, remove the 16 capscrews (items 9 & 10), and nuts that fasten the elbows (items 16) to the outer chambers (items 13). Remove the elbows with the manifolds and spacers attached.

Step #2: Removing the outer chambers.

Using a 1/2" wrench or socket, remove the 16 capscrews (items 9 and 11), and nuts that fasten the outer chambers, diaphragms, and intermediate bracket (item 4) together.

Step #3: Removing the diaphragm assemblies.

Use a 3/4" wrench or six pointed socket to remove the diaphragm assemblies (outer plate, diaphragm, and inner plate) from the diaphragm rod (item 30) by turning counterclockwise.

Insert a 6-32 set screw into the smaller tapped hole in the inner diaphragm plate (item 26). Insert the protruding stud and the 6-32 fastener loosely into a vise. Use a 3/4" wrench or socket to remove the outer diaphragm plate (item 25) by turning counterclockwise. Inspect the diaphragm (item 14) for cuts, punctures, abrasive wear or chemical attack. Replace the diaphragms if necessary.

Step #4: Installing the diaphragms.

Push the threaded stud of the outer diaphragm plate through the center hole of the diaphragm. Thread the inner plate clockwise onto the stud. Use a torque wrench to tighten the diaphragm assembly together to 90 in lbs. (10.17 Newton meters) 120 in lbs Santoprene (13.56 Newton meters). Allow a minimum of 15 minutes to elapse after torquing, then re-torque the assembly to compensate for stress relaxation in the clamped assembly.

Step #5: Installing the diaphragm assemblies to the pump.

Make sure the bumper (item 6) is installed over the diaphragm rod.

Thread the stud of the one diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 30) until the inner diaphragm plate is flush to the end of the rod. Insert rod into pump.

Align the bolt holes in the diaphragm with the bolt pattern in the intermediate bracket (item 4). Make sure the molded directional arrows on the diaphragm point vertically.

Fasten the outer chamber (item 13) to the pump, using the capscrews (items 9 & 11), hex nuts and flat washers.

On the opposite side of the pump, pull the diaphragm rod out as far as possible. Make sure the bumper (item 6) is installed over the diaphragm rod.

Thread the stud of the remaining diaphragm assembly clockwise into the tapped hole at the end of the diaphragm rod (item 30) as far as possible and still allow for alignment of the bolt holes in the diaphragm with the bolt pattern in the inner chamber. The molded directional arrows on the diaphragm must point vertically.

Fasten the remaining outer chamber (item 13) to the pump, using the capscrews (items 9 and 11) and hex nuts.

Step #6: Re-install the elbow/ spacer/manifold assemblies to the pump, using the capscrews (items 9 & 10) and hex nuts.

The pump is now ready to be re-installed, connected and returned to operation.

OVERLAY DIAPHRAGM SERVICING

The PTFE overlay diaphragm (item 15) is designed to fit snugly over the exterior of the standard TPE diaphragm (item 14).

The molded directional arrows on the overlay diaphragm must point vertically.

Follow the same procedures described for the standard diaphragm for removal and installation.

Follow the same procedures described for the standard diaphragm for removal and installation. **Note:** The One-Piece Bonded diaphragm is installed in the direction as shown in the lower right illustration above.

ONE PIECE DIAPHRAGM SERVICING (Bonded PTFE with integral plate)

The One Piece diaphragm has a threaded stud installed in the integral plate at the factory. The inner diaphragm plate has a through hole instead of a threaded hole.

Place the inner plate over the diaphragm stud and thread the first diaphragm / inner plate onto the diaphragm rod only until the inner plate contacts the rod. Do not tighten.

A small amount of grease may be applied between the inner plate and the diaphragm to facilitate assembly.

Insert the diaphragm / rod assembly into the pump and install the outer chamber. Turn the pump over and thread the second diaphragm / inner plate onto the diaphragm rod. Turn the diaphragm until the inner plate contacts the rod and hand tighten the assembly. Continue tightening until the bolt holes align with the inner chamber holes. DO NOT LEAVE THE ASSEMBLY LOOSE.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

Dual Port Option Drawing

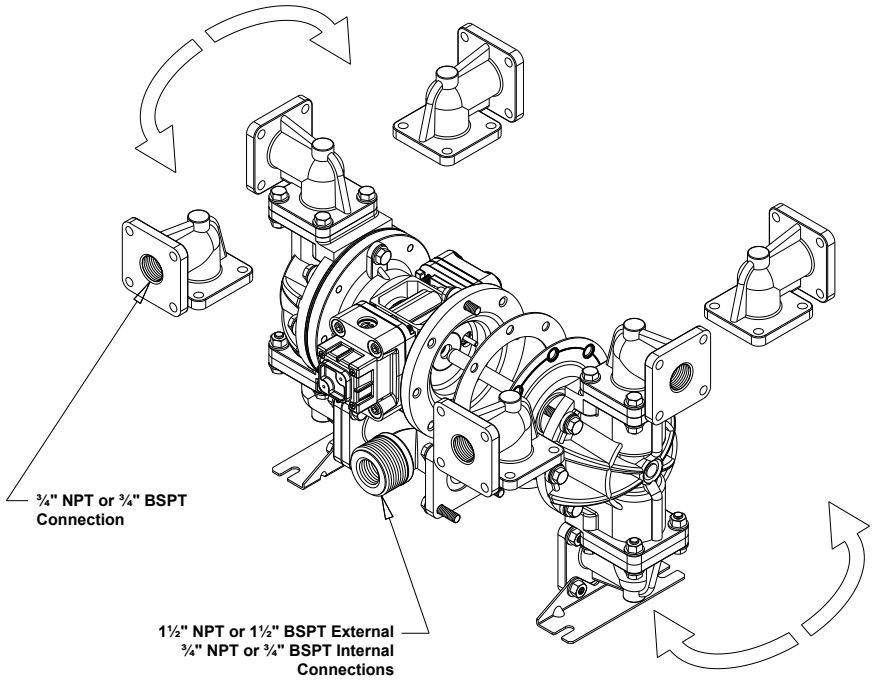


Illustration for Single Port Suction with Dual Port Discharge

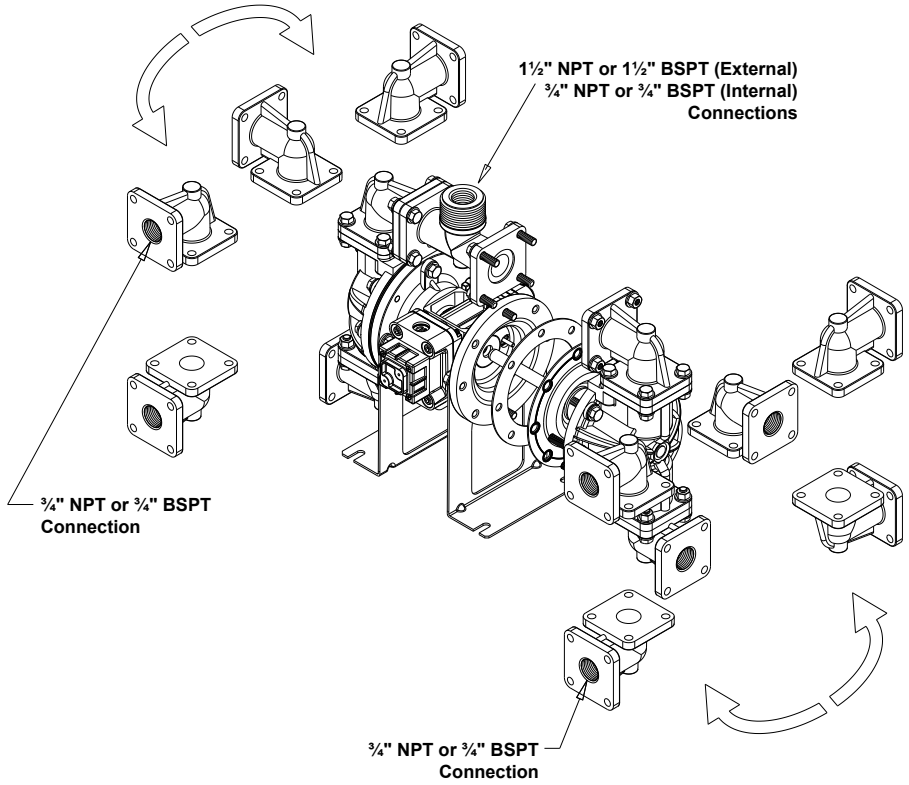


Illustration for Dual Port Suction and Single or Dual Port Discharge

DUAL PORTING OPTIONS

Several dual porting options are possible. The pump can be converted to a dual port arrangement on both the suction and the discharge ends. The porting can be configured to a single suction and a dual discharge. The porting can be changed to a dual suction and a single discharge.

The above changes are possible because the porting flange of the elbows (items 17) are designed to mate with 3/4" NPT or 3/4" BSPT (tapered) connection.

DUAL PORTING OF BOTH SUCTION AND DISCHARGE ENDS OF THE PUMP

Converting the pump from the standard single suction and discharge porting configuration to dual porting at each end is easy. Simply remove the manifold seals and manifold (items 33 and 22 from pump assembly drawing) from the pump.

The discharge elbows and suction elbows can be rotated 90° increments (see arrows and optional positioning in the Dual Porting Drawing).

SINGLE PORTING OF THE SUCTION AND DUAL PORTING OF THE PUMP DISCHARGE

To convert the pump from the standard single suction and single discharge porting configuration to a dual suction porting arrangement remove the only the discharge manifolds and manifold seals. Position the discharge at 90° increments. (See arrows and optional positioning in the Dual Porting Drawing).

DUAL PORTING OF THE SUCTION AND DUAL PORTING OF THE PUMP DISCHARGE

To convert the pump from the standard single suction and single discharge porting configuration to a dual suction porting arrangement remove the only the suction (bottom) manifolds and manifold seals.

Position the suction elbows in the desired direction at 90° increments. (See arrows and optional positioning in the Dual Porting Drawing.)

NOTE: See Repair Parts List on next page.

⚠ IMPORTANT

Read these instructions completely, before installation and start-up. It is the responsibility of the purchaser to retain this manual for reference. Failure to comply with the recommendations stated in this manual will damage the pump, and void factory warranty.

SINGLE PORT SUCTION REPAIR PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
10*	171-063-115	Capscrew, Flanged 5/16-18 x 1.25	16
	171-063-308	Capscrew, Flanged 5/16-18 x 1.25	16
16*	312-107-502E	Elbow, 3/4" BSPT (replaces 312-107-502)	1
	312-107-502N	Elbow, 3/4" NPT (replaces 312-107-502)	1
	312-107-520E	Elbow, 3/4" BSPT (replaces 312-107-520)	1
	312-107-520N	Elbow, 3/4" NPT (replaces 312-107-520)	1
	312-107-542E	Elbow, 3/4" BSPT (replaces 312-107-542)	1
	312-107-542N	Elbow, 3/4" NPT (replaces 312-107-542)	1
	312-107-552E	Elbow, 3/4" BSPT (replaces 312-107-552)	1
	312-107-552N	Elbow, 3/4" NPT (replaces 312-107-552)	1
21*	518-139-502	Manifold (installed in bottom position) NPT	1
	518-139-502E	Manifold (installed in bottom position) BSPT	1
	518-139-520	Manifold (installed in bottom position) NPT	1
	518-139-520E	Manifold (installed in bottom position) BSPT	1
	518-139-542	Manifold (installed in bottom position) NPT	1
	518-139-542E	Manifold (installed in bottom position) BSPT	1
	518-139-552	Manifold (installed in bottom position) NPT	1
	518-139-552E	Manifold (installed in bottom position) BSPT	1
23*	544-005-115	Nut, Flanged 5/16-18	16
	544-005-308	Nut, Flanged 5/16-18	16

SINGLE PORT DISCHARGE REPAIR PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QTY
10*	171-063-115	Capscrew, Flanged 5/16-18 x 1.25	16
	171-063-308	Capscrew, Flanged 5/16-18 x 1.25	16
11*	171-064-115	Capscrew, Flanged 5/16-18 x 1.50	4
	171-064-308	Capscrew, Flanged 5/16-18 x 1.50	4
16*	312-107-502E	Elbow, 3/4" BSPT (replaces 312-107-502)	1
	312-107-502N	Elbow, 3/4" NPT (replaces 312-107-502)	1
	312-107-520E	Elbow, 3/4" BSPT (replaces 312-107-520)	1
	312-107-520N	Elbow, 3/4" NPT (replaces 312-107-520)	1
	312-107-542E	Elbow, 3/4" BSPT (replaces 312-107-542)	1
	312-107-542N	Elbow, 3/4" NPT (replaces 312-107-542)	1
	312-107-552E	Elbow, 3/4" BSPT (replaces 312-107-552)	1
	312-107-552N	Elbow, 3/4" NPT (replaces 312-107-552)	1
21*	518-139-502	Manifold (installed in bottom position) NPT	1
	518-139-502E	Manifold (installed in bottom position) BSPT	1
23*	544-005-115	Nut, Flanged 5/16-18	28
	544-005-308	Nut, Flanged 5/16-18	28
	518-139-520	Manifold (installed in bottom position) NPT	1
	518-139-520E	Manifold (installed in bottom position) BSPT	1
	518-139-542	Manifold (installed in bottom position) NPT	1
	518-139-542E	Manifold (installed in bottom position) BSPT	1
	518-139-552	Manifold (installed in bottom position) NPT	1
	518-139-552E	Manifold (installed in bottom position) BSPT	1
37	115-143-080	Bracket, Free Standing (replaces 115-141-115)	2
	115-143-305	Bracket, Free Standing (replaces 115-141-115)	2
	115-143-306	Bracket, Free Standing (replaces 115-141-115)	2
38	171-068-115	Capscrew, Flanged 5/16-18 x 1.63	8
	171-068-308	Capscrew, Flanged 5/16-18 x 1.63	8

ITEM	PART NUMBER	DESCRIPTION	QTY
10*	171-063-115	Capscrew, Flanged 5/16-18 x 1.25	8
	171-063-308	Capscrew, Flanged 5/16-18 x 1.25	8
11*	171-064-115	Capscrew, Flanged 5/16-18 x 1.50	4
	171-064-308	Capscrew, Flanged 5/16-18 x 1.50	4
16*	312-107-502E	Elbow, 3/4" BSPT (replaces 312-107-502)	4
	312-107-502N	Elbow, 3/4" NPT (replaces 312-107-502)	4
	312-107-520E	Elbow, 3/4" BSPT (replaces 312-107-520)	4
	312-107-520N	Elbow, 3/4" NPT (replaces 312-107-520)	4
	312-107-542E	Elbow, 3/4" BSPT (replaces 312-107-542)	4
	312-107-542N	Elbow, 3/4" NPT (replaces 312-107-542)	4
	312-107-552E	Elbow, 3/4" BSPT (replaces 312-107-552)	4
	312-107-552N	Elbow, 3/4" NPT (replaces 312-107-552)	4
21*	518-139-502	Manifold (none required)	
	518-139-502E	Manifold (none required)	
	518-139-520	Manifold (none required)	
	518-139-520E	Manifold (none required)	
	518-139-542	Manifold (none required)	
	518-139-542E	Manifold (none required)	
	518-139-552	Manifold (none required)	
	518-139-552E	Manifold (none required)	
23*	544-005-115	Nut, Flanged 5/16-18	20
	544-005-308	Nut, Flanged 5/16-18	20
37	115-143-080	Bracket, Free Standing (replaces 115-141-115)	2
	115-143-305	Bracket, Free Standing (replaces 115-141-115)	2
	115-143-306	Bracket, Free Standing (replaces 115-141-115)	2
38	171-068-115	Capscrew, Flanged 5/16-18 x 1.63	8
	171-068-308	Capscrew, Flanged 5/16-18 x 1.63	8

***Quantities change from Composite Repair Parts List.**

PUMPING HAZARDOUS LIQUIDS

When a diaphragm fails, the pumped liquid or fumes enter the air end of the pump. Fumes are exhausted into the surrounding environment. When pumping hazardous or toxic materials, the exhaust air must be piped to an appropriate area for safe disposal. See illustration #1 at right.

This pump can be submerged if the pump materials of construction are compatible with the liquid being pumped. The air exhaust must be piped above the liquid level. See illustration #2 at right. Piping used for the air exhaust must not be smaller than 1/2" (1.27 cm) diameter. Reducing the pipe size will restrict air flow and reduce pump performance. When the pumped product source is at a higher level than the pump (flooded suction condition), pipe the exhaust higher than the product source to prevent siphoning spills. See illustration #3 at right.

CONVERTING THE PUMP FOR PIPING THE EXHAUST AIR

The following steps are necessary to convert the pump to pipe the exhaust air away from the pump.

Use a Phillips screwdriver to remove the four self-tapping screws (item 1-H).

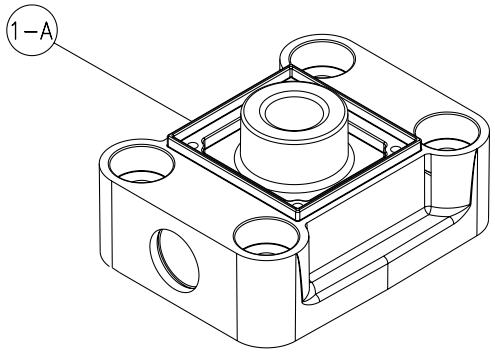
Remove the muffler cap and muffler (items 1-G and 1-F). The 3/8" NPT molded threads in the air distribution valve body (item 1-A).

IMPORTANT INSTALLATION NOTE:

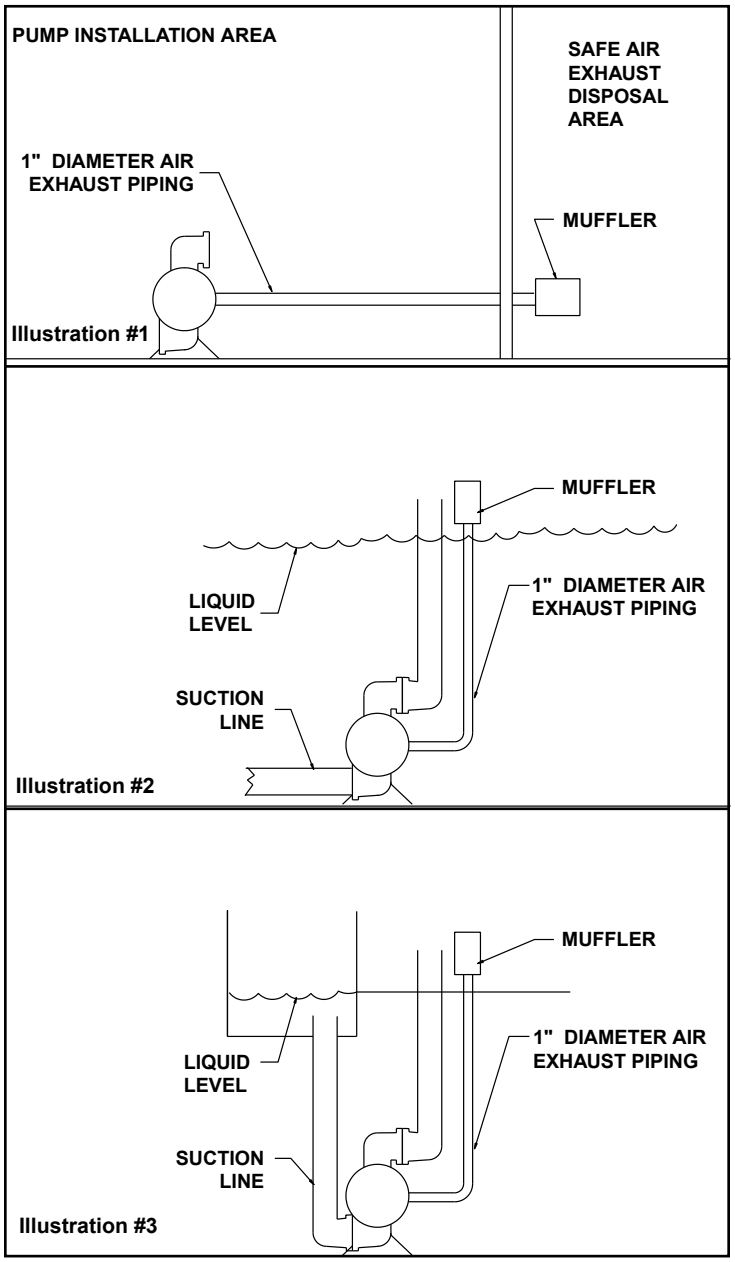
The manufacturer recommends installing a flexible hose or connection between the pump and any rigid plumbing. This reduces stresses on the molded plastic threads of the air exhaust port. Failure to do so may result in damage to the air distribution valve body.

Any piping or hose connected to the pump's air exhaust port must be physically supported. Failure to support these connections could also result in damage to the air distribution valve body.

Exhaust Conversion Drawing



CONVERTED EXHAUST ILLUSTRATION

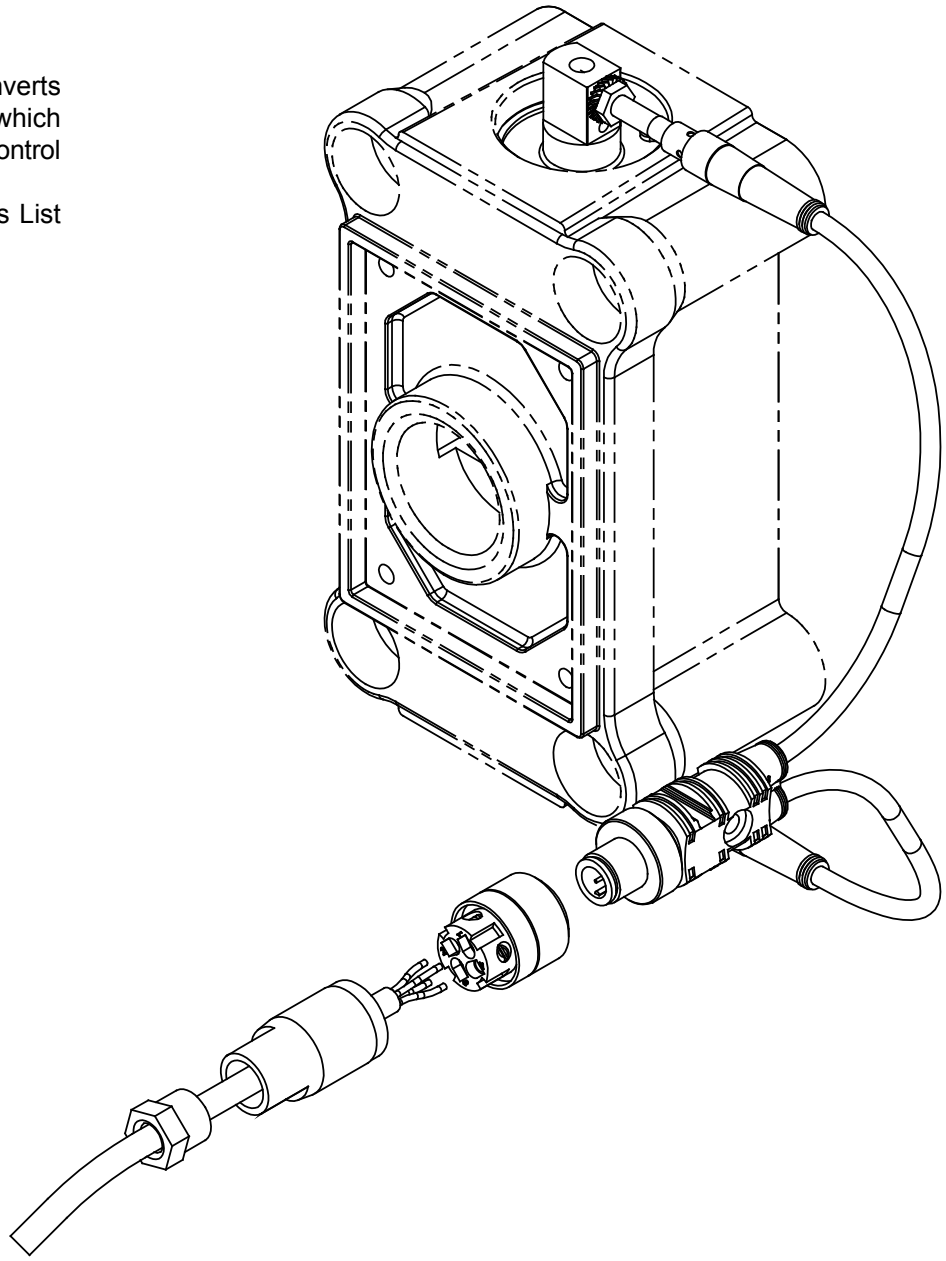


Pulse Output Kit Drawing

PULSE OUTPUT KIT OPTION

This pump can be fitted with a Pulse Output Kit. This converts the mechanical strokes of the pump to an electrical signal which interfaces with the Stroke Counter/ Batch Controller or user control devices such as a PLC.

See the individual kits listed on the Pump Repair Parts List for further information.



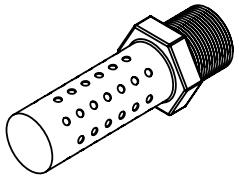
Optional Muffler Configurations, Drawing

OPTION 0
530-031-550 Integral Muffler uses (1) Cap and (4) 706-027-115 Machine Screw to hold it in place.

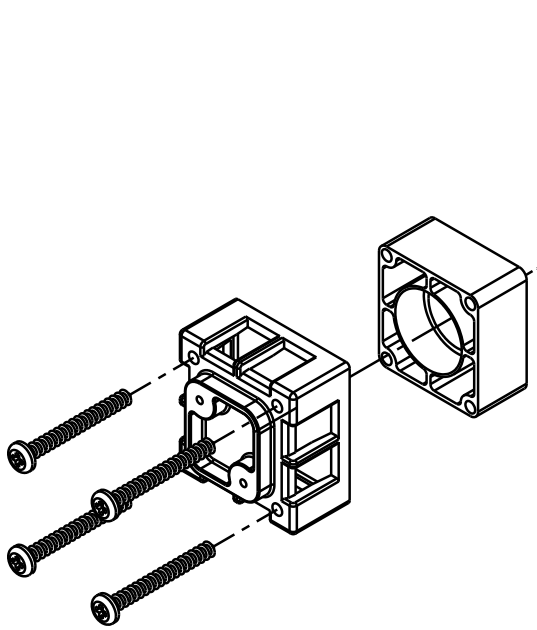
OPTION 1
530-024-000 Sound Dampening Muffler screws directly into the Air Valve body. This muffler is equipped with a porous plastic element.

OPTION 2
530-023-000 Mesh Muffler screws directly into the Air Valve Body. This muffler is equipped with a metal element.

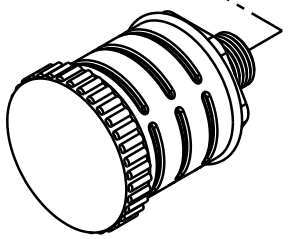
OPTION 6
530-035-000 Metal Muffler screws directly into the Air Body.



Option 6



Option 0



Option 1 and 2

WARREN RUPP, INC.®

Declaration of Conformity

Manufacturer: Warren Rupp, Inc.®, 800 N. Main Street
Mansfield, Ohio, 44902 USA

Certifies that Air-Operated Double Diaphragm Pump Series: HDB, HDF, M Non-Metallic, S Non-Metallic, M Metallic, S Metallic, T Series, G Series, U Series, EH and SH High Pressure, RS Series, W Series, SMA and SPA Submersibles, and Tranquilizer Surge Suppressors comply with the European Community Directive 2006/42/EC on Machinery, according to Annex VIII. This product has used Harmonized Standard EN809:1998+A1:2009, Pumps and Pump Units for Liquids - Common Safety Requirements, to verify conformance.

David Roseberry
Signature of authorized person

October 20, 2005
Date of issue

David Roseberry
Printed name of authorized person

Engineering Manager
Title

Revision Level: F

August 23, 2012
Date of revision

CE

IDEX FLUID & METERING